

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 20 December 2000 (20.12.00)	
International application No. PCT/CA00/00520	Applicant's or agent's file reference 6321-1pct
International filing date (day/month/year) 04 May 2000 (04.05.00)	Priority date (day/month/year) 06 May 1999 (06.05.99)
Applicant HOPKINS, Gordon, Duane	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 21 November 2000 (21.11.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
 34, chemin des Colombettes
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Charlotte ENGER

Telephone No.: (41-22) 338.83.38

INTERNATIONAL SEARCH REPORT

National Application No.

PCT/CA 00/00520

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A62C13/64 A62C31/02 A62C39/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A62C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 02863 A (BROEMME ALBRECHT) 30 January 1997 (1997-01-30) page 5, last line -page 10, last line; figures ---	1-22
A	DE 197 24 339 A (JURKE STEFFEN) 5 February 1998 (1998-02-05) column 1, line 3 - line 38; figure ---	1-22
A	US 4 862 968 A (WOODMAN STUART D) 5 September 1989 (1989-09-05) column 2, line 18 -column 5, line 38; figures ---	1-22
A	DE 27 47 588 A (HAHN METALLBAU GMBH) 10 May 1979 (1979-05-10) page 8, line 4 -page 10, line 24; figures ---	1-22
	--- -/--	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

30 August 2000

Date of mailing of the international search report

07/09/2000

Name and mailing address of the ISA

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Authorized officer

Triantaphillou, P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/00520

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 314 354 A (BRITISH PETROLEUM CO PLC) 3 May 1989 (1989-05-03) column 7, line 57 -column 13, line 23; figures -----	1-22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 00/00520

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9702863	A	30-01-1997	DE 29510976 U DE 29510982 U AU 3564095 A	31-08-1995 21-09-1995 10-02-1997
DE 19724339	A	05-02-1998	NONE	
US 4862968	A	05-09-1989	CA 1305106 A	14-07-1992
DE 2747588	A	10-05-1979	NONE	
EP 0314354	A	03-05-1989	AT 91082 T AU 2390588 A CA 1332139 A DE 3882112 A DE 3882112 T ES 2041318 T JP 1164378 A JP 2795444 B KR 9701790 B NO 174280 B NZ 226630 A US 5014790 A ZA 8807745 A	15-07-1993 04-05-1989 27-09-1994 05-08-1993 07-10-1993 16-11-1993 28-06-1989 10-09-1998 15-02-1997 03-01-1994 25-06-1991 14-05-1991 27-06-1990

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 6321-1 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA00/00520	International filing date (day/month/year) 04/05/2000	Priority date (day/month/year) 06/05/1999
International Patent Classification (IPC) or national classification and IPC A62C13/64		
Applicant TERRA NOVA MARINE COMPANY LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 5 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 11 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 21/11/2000	Date of completion of this report 16.08.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schut, T Telephone No. +49 89 2399 8970



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/00520

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1,4-8	as originally filed		
1a,2a,3	as received on	14/05/2001	with letter of 09/05/2001
2	with telefax of	30/07/2001	

Claims, No.:

1-22	with telefax of	30/07/2001
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Drawings, sheets:

1/7-7/7	as originally filed
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/00520

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-22
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1,3-22
	No:	Claims	2
Industrial applicability (IA)	Yes:	Claims	1-22
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00520

R Item V: R as n d statement with regard t nov lty, inventiv step or industrial applicability

Claim 1

WO 97 02863 A describes an apparatus for producing a fine liquid mist according to the preamble of claim 1. It also describes a mixing chamber (111) having two separate inlets at one end, a first inlet (15a) for injection of said liquid radially into the mixing chamber and a second inlet (11a) for injection of said gas axially into said mixing chamber (111) for atomization of said liquid.

The subject-matter of claim 1 differs from the above described in that the container is for holding a gas and a liquid **together** and having two valves for regulating and controlling the flow of liquid or gas.

The prior art documents do not disclose an extinguisher with the liquid and the gas together in one container and using two valves to control and regulate the flow of gas and liquid separately. Normally, gas and liquid are mixed and are expelled together through one valve. Alternatively, the liquid is expelled through a riser pipe.

Claim 2

WO 97 02863 A describes a valve 52 (p. 5, last line-p. 6, l. 6) which is connected to the containers for liquid and gas. This valves serves the same function as the one in the application: it connects a gas inlet to a gas outlet and a liquid inlet to a liquid outlet. Both outlets are connected to their inlets by using single actuating means 53. The fact that the gas and liquid are together in one container is not essential for the valve; the valve has to be provided with independent inlets and outlets in both cases.

Consequently, the known valve would be suitable for simultaneously releasing a gas and a liquid separately from a pressurized container containing gas and liquid together as long as conduits are provided from the container. The layout of the valves has not been disclosed in WO 97 02863 A, but since the usual mode of operation of a fire extinguisher is to press down a lever to release the extinguishant, it would be obvious for the skilled person to use spaced apart valves in order to allow a translationary movement for actuation of both valves.



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00520

The subject-matter of claim 2 does not involve an inventive step.

Claim 11

Claim 11 refers to a liquid mist fire extinguisher having the same inventive features as claim 1.

Re Item VII **Certain defects in the international application**

Although claims 1 and 11 are drafted in the two-part form the features concerning the mixing chamber (see V) is incorrectly placed in the characterising portion. Furthermore, the prior art does not disclose a container containing gas and liquid **together**. This feature has been incorrectly placed in the preamble of the independent claims.



It is therefore an aspect of the present invention to provide an extinguisher in which water and air are stored together and are released simultaneously and separately to produce a fine liquid mist, capable of class A:B:C rating.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an apparatus for producing a fine liquid mist, characterized in that the apparatus includes a container for holding a gas and liquid under pressure, valve means for simultaneously releasing the gas and the liquid separately from the container, a nozzle including a mixing chamber and outlet orifices for emission of the liquid mist, the outlet orifices being at an end of the mixing chamber, feed means for feeding the gas and the liquid separately to the mixing chamber and the mixing chamber having two separate inlets at one end, a first inlet for injection of the liquid radially into the mixing chamber and a second inlet for injection of the gas axially into the mixing chamber for atomization of the liquid.

In another aspect of the present invention, there is provided a release valve for simultaneously releasing a gas and a liquid separately from a pressurized container containing the gas and liquid and to permit feeding the liquid and the gas as individual, separate fluid streams from the container and to and through the valve, characterized in that the release valve includes a first valve for controlling and regulating the flow of liquid from a container to a first supply means, a second valve for controlling and regulating the flow of gas from the container to a second supply means and a single actuating means connected to both valves for simultaneously actuating the valves.

In a further embodiment of the present invention, there is provided a liquid mist fire extinguisher, characterized in that the extinguisher includes a container for holding a gas and a liquid under pressure, a valve assembly at an upper end of the

container, valve means for simultaneously releasing the gas and the liquid separately from the container, a hose for feeding the gas and the liquid separately through a nozzle, the nozzle assembly including means for feeding the gas and the liquid separately through a mixing chamber and exiting orifices in an end surface of the nozzle assembly for issue of mixed gas and liquid in a fine mist.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross-section of a fire extinguisher according to the present invention;

Figure 2 is a cross-section of the valve structure at the top of the extinguisher of

Figure 1, to a larger scale, and at right angles to that of Figure 1; with valve closed;

Figure 3 is a cross section similar to that of Figure 2, with valve open;

Figure 4 is a cross section of the valve structure, on the axis of the cross section of Figure 1;

Figure 5 is a longitudinal cross section through the nozzle;

Figure 6 is an end view on the end of the nozzle member, in the direction of arrow A.

Figure 7 is a cross-section of another embodiment of the valve structure of the present invention, on the axis of the cross-section Figure 1.

Figure 8 is a cross section of another embodiment of the valve structure of the present invention, on the axis of the cross section of Figure 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings illustrate a fire extinguisher assembly having an A, B and C rating comprising a pressure container 10 of, for example, an approximately 12L capacity having at its upper end a valve structure 12, and flexible hose 14 with a relatively ridged wand portion 16, and a nozzle assembly 18 at the end of the wand 16. The valve structure 12 closes the upper end of the container which, in use contains a liquid, for example, water, at its lower portion 20 and a pressurizing gas, for

I CLAIM

1. An apparatus for producing a fine liquid mist, characterized in that :
 - a container (10) for holding a gas and liquid under pressure;
 - valve means (12) for simultaneously releasing said gas and said liquid separately from said container (10);
 - a nozzle (18) including a mixing chamber (126) and outlet orifices (132) for emission of said liquid mist, said outlet orifices (132) being at an end of said mixing chamber (126);
 - feed means (14) for feeding said gas and said liquid separately to said mixing chamber; and
 - said mixing chamber (126) having two separate inlets at one end, a first inlet (125) for injection of said liquid radially into the mixing chamber and a second inlet (128) for injection of said gas axially into said mixing chamber (126) for atomization of said liquid.
2. A release valve for simultaneously releasing a gas and a liquid separately from a pressurized container containing said gas and liquid and to permit feeding said liquid and said gas as individual, separate fluid streams from said container and to and through said valve, characterized in that :
 - a first valve (62) for controlling and regulating the flow of liquid from a container (10) to a first supply means (112);
 - a second valve (64) for controlling and regulating the flow of gas from said container (10) to a second supply means (110) ; and
 - a single actuating means (82) connected to both valves for simultaneously actuating said valves.
3. A release valve according to claim 2, comprising an elongate valve member

(60), and spaced apart valve seats (38, 42), said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position intermediate the other end of said valve member (60) and said first valve (62), said means (82) for actuating said valves positioned at the other end of said valve member (60).

4. A release valve according to claim 3, further comprising an enlargement at said one end, movable axially to open and close an orifice.
5. A release valve according to claim 4, further comprising a reduced section at said intermediate position, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
6. A release valve according to claim 5, comprising a valve body (30), said elongate member (60) positioned in a bore in said valve body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in said bore.
7. A release valve according to claim 6, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the other end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means for feeding said gas from said chamber (46) to said outlet.
8. A release valve according to claim 7, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means(14).
9. A release valve according to claim 8, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a transfer passage (46) in said body (30) at a position intermediate the other end of said bore, said



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reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said transfer passage (46) to said outlet.

10. A release valve according to claim 9, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
11. A liquid mist fire extinguisher, characterized in that:
 - a container (10) for holding a gas and a liquid under pressure;
 - a valve assembly (12) at an upper end of said container (10);
 - valve means (62,64) for simultaneously releasing said gas and said liquid separately from said container (10);
 - a hose (14) for feeding said gas and said liquid separately through a nozzle (18); said nozzle assembly (18) including means for feeding said gas and said liquid separately through a mixing chamber (126), and exiting orifices (132) in an end surface (130) of said nozzle assembly (18) for issue of mixed gas and liquid in a fine mist.
12. A fire extinguisher as claimed in claim 11, including a gas conveying tube (110) within said hose (14) for feeding said gas.
13. A fire extinguisher as claimed in claim 12, said valve means (60) comprising a first valve (62) controlling a liquid outlet from said container (10), a second valve (64) controlling a gas outlet from said container (10), means (14) for feeding said liquid and said gas separately from said valves, and means (82) for actuating said valves simultaneously.
14. A fire extinguisher as claimed in claim 13, said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position

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intermediate at the other end of said valve member (60) and said first valve (62), said means (82) for actuating the said valves simultaneously positioned at the other end of said valve member (60).

15. A fire extinguisher as claimed in claim 14, further comprising an enlargement at said one end, movable axially to open and close an orifice.
16. A fire extinguisher as claimed in claim 15, further comprising a reduced section at said intermediate position, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
17. A fire extinguisher as claimed in claim 16, comprising a valve body (30), an elongated member (60) positioned in a bore in said body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in a said bore.
18. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the outer end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means (70) for feeding said gas from said chamber (46) to said outlet.
19. A fire extinguisher as claimed in claim 18, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
20. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a transfer passage (46) in said body (30) at a position intermediate the outer end of said bore, said reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said



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transfer passage (46) to said outlet.

21. A fire extinguisher as claimed in claim 20, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
22. A fire extinguisher according to claim 11, wherein said nozzle assembly (18) includes an angled face (130) at one end.

PCT REQUEST

6321-1pct

Original (for SUBMISSION) - printed on 04.05.2000 11:54:56 AM

0	For receiving Office use only	
0-1	International Application No.	PCT/CA/ 00 / 00520
0-2	International Filing Date	04 MAY 2000 (04.05.00)
0-3	Name of receiving Office and "PCT International Application"	RO/CA
0-4	Form - PCT/RO/101 PCT Request Prepared using	PCT-EASY Version 2.90 (updated 15.12.1999)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	Canadian Patent Office (RO/CA)
0-7	Applicant's or agent's file reference	6321-1pct
I	Title of invention	LIQUID MIST FIRE EXTINGUISHER
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	TERRA NOVA MARINE COMPANY LIMITED
II-5	Address:	119 Clyde Avenue Mount Pearl, Newfoundland & Labrador A1N 4R9 Canada
II-6	State of nationality	CA
II-7	State of residence	CA
II-8	Telephone No.	(709) 747-1565
II-9	Facsimile No.	(709) 747-1541
III-1	Applicant and/or inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	HOPKINS, Gordon, Duane
III-1-5	Address:	c/o Terra Nova Marine Company Limited 119 Clyde Avenue Mount Pearl, Newfoundland & Labrador A1N 4R9 Canada
III-1-6	State of nationality	CA
III-1-7	State of residence	CA

PCT REQUEST

6321-1pct

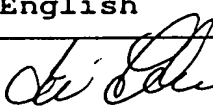
Original (for SUBMISSION) - printed on 04.05.2000 11:54:56 AM

IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name (LAST, First)	ZAHL, Adrian
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IV-2-4	Facsimile No.	(613) 234-5233
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IV-3	Additional agent(s)	agent
IV-3-1	Name (LAST, First)	O'HARA, Maryann
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IV-3-4	Facsimile No.	(613) 234-5233
IV-3-5	e-mail	mfpattm@magi.com
V	Designation of States	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT

PCT REQUEST

6321-1pct

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V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AL AM AT AU AZ BA BB BG BR BY CA CH&LI CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW	
V-5	Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.		
V-6	Exclusion(s) from precautionary designations	NONE	
VI-1	Priority claim of earlier national application		
VI-1-1	Filing date	06 May 1999 (06.05.1999)	
VI-1-2	Number	09/306,017	
VI-1-3	Country	US	
VII-1	International Searching Authority Chosen	European Patent Office (EPO) (ISA/EP)	
VIII	Check list	number of sheets	electronic file(s) attached
VIII-1	Request	4	-
VIII-2	Description	8	-
VIII-3	Claims	5	-
VIII-4	Abstract	1	6321-1pct.txt
VIII-5	Drawings	7	-
VIII-7	TOTAL	25	
VIII	Accompanying items	paper document(s) attached	electronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-9	Separate signed power of attorney	one of two	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-18	Figure of the drawings which should accompany the abstract	1	
VIII-19	Language of filing of the International application	English	
IX-1	Signature of applicant or agent		
IX-1-1	Name (LAST, First)	FINCHAM, Ian	

PCT REQUEST

6321-1pct

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FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	0 4 MAY 2000 (0 4 . 0 5 . 0 0)
10-2	Drawings:	
10-2-1	Received <input checked="" type="checkbox"/>	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/EP
10-6	Transmittal of search copy delayed until search fee is paid	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
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PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 6321-1pct	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/CA 00/ 00520	International filing date (day/month/year) 04/05/2000	(Earliest) Priority Date (day/month/year) 06/05/1999
Applicant TERRA NOVA MARINE COMPANY LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/CA 00/00520

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A62C13/64 A62C31/02 A62C39/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A62C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 02863 A (BROEMME ALBRECHT) 30 January 1997 (1997-01-30) page 5, last line -page 10, last line; figures ---	1-22
A	DE 197 24 339 A (JURKE STEFFEN) 5 February 1998 (1998-02-05) column 1, line 3 - line 38; figure ---	1-22
A	US 4 862 968 A (WOODMAN STUART D) 5 September 1989 (1989-09-05) column 2, line 18 -column 5, line 38; figures ---	1-22
A	DE 27 47 588 A (HAHN METALLBAU GMBH) 10 May 1979 (1979-05-10) page 8, line 4 -page 10, line 24; figures --- -/--	1-22



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

30 August 2000

Date of mailing of the international search report

07/09/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
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Authorized officer

Triantaphillou, P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/00520

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>EP 0 314 354 A (BRITISH PETROLEUM CO PLC) 3 May 1989 (1989-05-03) column 7, line 57 -column 13, line 23; figures</p> <p>-----</p>	1-22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 00/00520

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9702863	A	30-01-1997	DE 29510976 U DE 29510982 U AU 3564095 A	31-08-1995 21-09-1995 10-02-1997
DE 19724339	A	05-02-1998	NONE	
US 4862968	A	05-09-1989	CA 1305106 A	14-07-1992
DE 2747588	A	10-05-1979	NONE	
EP 0314354	A	03-05-1989	AT 91082 T AU 2390588 A CA 1332139 A DE 3882112 A DE 3882112 T ES 2041318 T JP 1164378 A JP 2795444 B KR 9701790 B NO 174280 B NZ 226630 A US 5014790 A ZA 8807745 A	15-07-1993 04-05-1989 27-09-1994 05-08-1993 07-10-1993 16-11-1993 28-06-1989 10-09-1998 15-02-1997 03-01-1994 25-06-1991 14-05-1991 27-06-1990

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 6321-1 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA00/00520	International filing date (<i>day/month/year</i>) 04/05/2000	Priority date (<i>day/month/year</i>) 06/05/1999
International Patent Classification (IPC) or national classification and IPC A62C13/64		
Applicant TERRA NOVA MARINE COMPANY LIMITED et al.		



1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 11 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 21/11/2000	Date of completion of this report 16.08.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schut, T Telephone No. +49 89 2399 8970 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/00520

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1,4-8 as originally filed

1a,2a,3 as received on 14/05/2001 with letter of 09/05/2001

2 with telefax of 30/07/2001

Claims, No.:

1-22 with telefax of 30/07/2001

Drawings, sheets:

1/7-7/7 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/00520

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-22
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1,3-22
	No:	Claims	2
Industrial applicability (IA)	Yes:	Claims	1-22
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00520

Re Item V: Reasoned statement with regard to novelty, inventive step or industrial applicability

Claim 1

WO 97 02863 A describes an apparatus for producing a fine liquid mist according to the preamble of claim 1. It also describes a mixing chamber (111) having two separate inlets at one end, a first inlet (15a) for injection of said liquid radially into the mixing chamber and a second inlet (11a) for injection of said gas axially into said mixing chamber (111) for atomization of said liquid.

The subject-matter of claim 1 differs from the above described in that the container is for holding a gas and a liquid **together** and having two valves for regulating and controlling the flow of liquid or gas.

The prior art documents do not disclose an extinguisher with the liquid and the gas together in one container and using two valves to control and regulate the flow of gas and liquid separately. Normally, gas and liquid are mixed and are expelled together through one valve. Alternatively, the liquid is expelled through a riser pipe.

Claim 2

WO 97 02863 A describes a valve 52 (p. 5, last line-p. 6, l. 6) which is connected to the containers for liquid and gas. This valve serves the same function as the one in the application: it connects a gas inlet to a gas outlet and a liquid inlet to a liquid outlet. Both outlets are connected to their inlets by using single actuating means 53. The fact that the gas and liquid are together in one container is not essential for the valve; the valve has to be provided with independent inlets and outlets in both cases.

Consequently, the known valve would be suitable for simultaneously releasing a gas and a liquid separately from a pressurized container containing gas and liquid together as long as conduits are provided from the container. The layout of the valves has not been disclosed in WO 97 02863 A, but since the usual mode of operation of a fire extinguisher is to press down a lever to release the extinguishant, it would be obvious for the skilled person to use spaced apart valves in order to allow a translationary movement for actuation of both valves.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00520

The subject-matter of claim 2 does not involve an inventive step.

Claim 11

Claim 11 refers to a liquid mist fire extinguisher having the same inventive features as claim 1.

Re Item VII **Certain defects in the international application**

Although claims 1 and 11 are drafted in the two-part form the features concerning the mixing chamber (see V) is incorrectly placed in the characterising portion. Furthermore, the prior art does not disclose a container containing gas and liquid **together**. This feature has been incorrectly placed in the preamble of the independent claims.

14-05-2001

PCT/CA00/00520

P. DESCPAMD

0/019367

-1A-

531 Rec'd PCT/PA 01 NOV 2001

WO 97 02863 to Richter, Joachim discloses a fire extinguisher and a specially designed spray nozzle for producing a jet of extinguishing agent, wherein the extinguisher comprises a pair of containers adapted to store carbon dioxide gas and extinguishing water, whereby upon mixing inside the spray nozzle the carbon dioxide gas causes the water droplets to freeze, allowing for improved throwing ranges.

10/019367

531 Rec'd PCT/FR 01 NOV 2001

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water and air are stored together and are released simultaneously and separately to produce a fine liquid mist, capable of class A:B:C rating.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an apparatus for producing a fine liquid mist, characterized in that the apparatus includes a container for holding a gas and liquid together under pressure, valve means for simultaneously releasing the gas and the liquid separately from the container, a nozzle including a mixing chamber and outlet orifices for emission of the liquid mist, the outlet orifices being at an end of the mixing chamber, feed means for feeding the gas and the liquid separately to the mixing chamber and the mixing chamber having two separate inlets at one end, a first inlet for injection of the liquid radially into the mixing chamber and a second inlet for injection of the gas axially into the mixing chamber for atomization of the liquid.

In another aspect of the present invention, there is provided a release valve for simultaneously releasing a gas and a liquid separately from a pressurized container containing the gas and liquid together and to permit feeding the liquid and the gas as individual, separate fluid streams from the container and to and through the valve, characterized in that the release valve includes a first valve for controlling and regulating the flow of liquid from a container to a first supply means, a second valve for controlling and regulating the flow of gas from the container to a second supply means and a single actuating means connected to a valve member including spaced apart first and second valves for simultaneously actuating the valves.

In a further embodiment of the present invention, there is provided a liquid mist fire extinguisher, characterized in that the extinguisher includes a container for holding a gas and a liquid together under pressure, a valve assembly at an upper end of the container, valve means for simultaneously releasing the gas and the liquid separately from the container, a hose for feeding the gas and the liquid separately

10/019367

-2A-

531 Rec'd PCT/PTC 01 NOV 2001

from the container to a second supply means, and whereby movement of the single actuating means effects opening a closing of the valves to effect control and regulation of flow of the liquid and the gas.

In a further embodiment of the present invention, there is provided a liquid mist fire extinguisher, comprising a container for holding a gas and a liquid under pressure, a valve assembly at an upper end of the container for releasing the gas and the liquid from the container, a hose and a nozzle assembly, characterized in that the extinguisher has a single actuating means for simultaneous release of the liquid and the gas by simultaneously actuating first and second valve means, the actuating means controlling spaced apart first and second valves, and wherein the valve means simultaneously releases the gas and the liquid separately from the container, the first valve means controlling and regulating the flow of liquid from a container and the second valve controlling and regulating the flow of gas from the container.

10/019367

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531 Rec'd PCT/FTC 01 NOV 2001

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross-section of a fire extinguisher according to the present invention;

Figure 2 is a cross-section of the valve structure at the top of the extinguisher of Figure 1, to a larger scale, and at right angles to that of Figure 1; with valve closed;

Figure 3 is a cross section similar to that of Figure 2, with valve open;

Figure 4 is a cross section of the valve structure, on the axis of the cross section of Figure 1;

Figure 5 is a longitudinal cross section through the nozzle;

Figure 6 is an end view on the end of the nozzle member, in the direction of arrow A.

Figure 7 is a cross-section of another embodiment of the valve structure of the present invention, on the axis of the cross-section Figure 1.

Figure 8 is a cross section of another embodiment of the valve structure of the present invention, on the axis of the cross section of Figure 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings illustrate a fire extinguisher assembly having an A, B and C rating comprising a pressure container 10 of, for example, an approximately 12L capacity having at its upper end a valve structure 12, and flexible hose 14 with a relatively ridged wand portion 16, and a nozzle assembly 18 at the end of the wand 16. The valve structure 12 closes the upper end of the container which, in use contains a liquid, for example, water, at its lower portion 20 and a pressurizing gas, for

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I CLAIM

1. An apparatus for producing a fine liquid mist, comprising a container (10) for holding a gas and liquid together under pressure, valve means (12) for releasing said gas and said liquid from said container (10); a nozzle (18), feed means (14) operatively connecting said nozzle and said container, and a mixing chamber (126) in the nozzle, said mixing chamber (126) having outlet orifices (132) for emission of said liquid mist, said outlet orifices (132) being at a discharge end of said mixing chamber (126),
c h a r a c t e r i z e d in that

said container having actuation means for simultaneously actuating first and second valve means, said actuation means comprising a single actuation lever for simultaneously opening and closing both of said valve means;

said valve means comprising a first valve (62) for controlling and regulating the flow of liquid from a container (10) to a first supply means (112) and a second valve (64) for controlling and regulating the flow of gas from said container (10) to a second supply means (110) ; wherein simultaneous release of said liquid and said gas is achieved when said single actuating lever (82) is displaced whereby movement of each of said first and second valves occurs, and wherein

said mixing chamber (126) includes two separate inlets at one end, a first inlet (125) for injection of said liquid radially into the mixing chamber and a second inlet (128) for injection of said gas axially into said mixing chamber (126) for atomization of said liquid.

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2. A release assembly for simultaneously releasing a gas and a liquid separately from a pressurized container containing said gas and liquid together and to permit feeding said liquid and said gas as individual, separate fluid streams from said container and to and through said valve, characterized in that :

the release assembly is a single actuating means (82) connected to a valve member including spaced apart first and second valves for simultaneously actuating said valves,

said first valve (62) for controlling and regulating the flow of liquid from a container (10) to a first supply means (112);

said second valve (64) for controlling and regulating the flow of gas from said container (10) to a second supply means (110) ; and whereby movement of said single actuating means effects simultaneous opening and closing of said valves to effect control and regulation of said simultaneous flow of said liquid and said gas from said valves.

3. A release valve according to claim 2, comprising an elongate valve member (60), and spaced apart valve seats (38, 42), said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position intermediate the other end of said valve member (60) and said first valve (62), said means (82) for actuating said valves positioned at the other end of said valve member (60).

4. A release valve according to claim 3, further comprising an enlargement at

AMENDED SHEET

-11-

said one end, movable axially to open and close an orifice.

5. A release valve according to claim 4, further comprising a reduced section at said intermediate position of said valve member 60, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
6. A release valve according to claim 5, comprising a valve body (30), said elongate member (60) positioned in a bore in said valve body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in said bore.
7. A release valve according to claim 6, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the other end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means for feeding said gas from said chamber (46) to said outlet.
8. A release valve according to claim 7, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
9. A release valve according to claim 8, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a transfer

AMENDED SHEET

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passage (46) in said body (30) at a position intermediate the ends of said bore, said reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said transfer passage (46) to said outlet.

10. A release valve according to claim 9, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).

11. A liquid mist fire extinguisher, comprising a container (10) for holding a gas and a liquid together under pressure, a valve assembly (12) at an upper end of said container (10) for releasing said gas and said liquid from said container (10), a hose and a nozzle assembly (18) and a mixing chamber (126), characterized in that

the extinguisher has a single actuating means (82) for simultaneous release of said liquid and said gas by simultaneously actuating first and second valve means (62, 64), said actuating means controlling spaced apart first and second valves (62, 64); and

wherein said valve means (62,64) simultaneously releases said gas and said liquid separately from said container (10), said first valve means (62) controlling and regulating the flow of liquid from a container (10) and said second valve (64) controlling and regulating the flow of gas from said container (10).

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12. A fire extinguisher as claimed in claim 11, including a gas conveying tube (110) within said hose (14) for feeding said gas.
13. A fire extinguisher as claimed in claim 12, said valve means (60) comprising a first valve (62) controlling a liquid outlet from said container (10), a second valve (64) controlling a gas outlet from said container (10), means (14) for feeding said liquid and said gas separately from said valves, and means (82) for actuating said valves simultaneously.
14. A fire extinguisher as claimed in claim 13, said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position intermediate at the other end of said valve member (60) and said first valve (62), said means (82) for actuating the said valves simultaneously positioned at the other end of said valve member (60).
15. A fire extinguisher as claimed in claim 14, further comprising an enlargement at said one end, movable axially to open and close an orifice.
16. A fire extinguisher as claimed in claim 15, further comprising a reduced section at said intermediate position, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
17. A fire extinguisher as claimed in claim 16, comprising a valve body (30), an

-14-

elongated member (60) positioned in a bore in said body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in a said bore.

18. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the outer end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means (70) for feeding said gas from said chamber (46) to said outlet.
19. A fire extinguisher as claimed in claim 18, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
20. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a transfer passage (46) in said body (30) at a position intermediate the ends of said bore, said reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said transfer passage (46) to said outlet.
21. A fire extinguisher as claimed in claim 20, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).

AMENDED SHEET

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22. A fire extinguisher according to claim 11, wherein said nozzle assembly (18) includes an angled face (130) at one end.

AMENDED SHEET,

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

ZAHL, Adrian et al.
McFADDEN, FINCHAM
225 Metcalfe Street, Suite 606
Ottawa, Ontario K2P 1P9
CANADA

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of mailing (day/month/year) 12.02.2001		
Applicant's or agent's file reference 6321-1 PCT	REPLY DUE within 3 month(s) from the above date of mailing	
International application No. PCT/CA00/00520	International filing date (day/month/year) 04/05/2000	Priority date (day/month/year) 06/05/1999
International Patent Classification (IPC) or both national classification and IPC A62C13/64		
Applicant TERRA NOVA MARINE COMPANY LIMITED et al.		

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:

- ☒ Basis of the opinion
 - ☐ Priority
 - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Lack of unity of invention
 - ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain document cited
 - ☒ Certain defects in the international application
 - ☒ Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 06/09/2001.

Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 </div> </div>	Authorized officer / Examiner Schut, T Formalities officer (incl. extension of time limits) Nilles, F Telephone No. +49 89 2399 2931
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WRITTEN OPINION

International application No. PCT/CA00/00520

I. Basis of the opinion

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".*):

Description, pages:

1-8 as originally filed

Claims, No.:

1-22 as originally filed

Drawings, sheets:

1/7-7/7 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
 - ☐ the language of publication of the international application (under Rule 48.3(b)).
 - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority in written form.
 - ☐ furnished subsequently to this Authority in computer readable form.
 - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

WRITTEN OPINION

International application No. PCT/CA00/00520

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Claims 11-13,21

Inventive step (IS) Claims 1,2,10

Industrial applicability (IA) Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V: Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Claim 1

WO 97 02863 A describes an apparatus for producing a fine liquid mist, comprising:

- a container (51) for holding a gas and liquid under pressure;
- valve means (52) for simultaneously releasing said gas and said liquid separately from said container (51) (p. 7, l. 13-16);
- a nozzle (110) including a mixing chamber (111) and an outlet orifice (21) for emission of said liquid mist, said outlet orifice (21) being at an end of said mixing chamber (111);
- feed means (54) for feeding said gas and said liquid separately to said mixing chamber; and
- said mixing chamber (111) having two separate inlets at one end, a first inlet (15a) for injection of said liquid radially into the mixing chamber and a second inlet (11a) for injection of said gas axially into said mixing chamber (111) for atomization of said liquid.

The subject-matter of claim 1 differs from the above described in that the nozzle comprises orifices instead of an orifice.

It seems obvious for the skilled person to experiment with the number of orifices to obtain the best atomization result.

Claim 2

WO 97 02863 A mentions the possibility of a multiple way valve. It seems that this equivalent to a release valve comprising:

- a first valve for controlling and regulating the flow of liquid from a container to a first supply means;
- a second valve for controlling and regulating the flow of gas from said container to a second supply means; and
- a single actuating means connected to both valves for simultaneously actuating said valves.

It is obvious for the skilled person to use either a multiple-way valve or use valves that are linked by a single actuating means.

Claim 11

WO 97 02863 A describes a liquid mist fire extinguisher, comprising:
a container (51) for holding a gas and a liquid under pressure;
a valve assembly (52) at an upper end of said container (51);
valve means (52) for simultaneously releasing said gas and said liquid separately from said container (51);
a hose (54) for feeding said gas and said liquid separately through a nozzle (55); said nozzle assembly (55) including means for feeding said gas and said liquid separately to a mixing chamber (126), and an exiting orifice (21) in an end surface of said nozzle assembly (55) for issue of mixed gas and liquid in a fine mist (p. 7, l. 17-21).

The subject-matter of claim 11 is not novel.

The features of claims 10, 12, 13 and 21 are either known from or obvious in respect of WO 97 02863 A.

Re Item VII: Certain defects in the international application

The independent claims should be the two-part form in accordance with Rule 6.3(b) PCT. Those features known in combination from WO 97 02863 being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).

The description should be adapted to the claims (Rule 5.1(a)(iii) PCT).

The above mentioned prior art documents should be briefly discussed in the description (Rule 5.1(a)(ii) PCT).

In order to facilitate the examination of the conformity of the amended application with the requirements of Article 34(2)(b) PCT, the applicant is requested to clearly identify the amendments carried out, no matter whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based (see also Rule 66.8(a))

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/CA00/00520

Re Item VIII: Certain observations on the international application

Claim 5 should specify which part of the release valve comprises a reduced section.

In claim 9 it seems that one needs two locations to which the transfer passage can be in an intermediate position. The expression "intermediate the other end ..." is not clear.

In claim 11 it should be stated that the hose is for feeding ... separately **to** a nozzle, since at the nozzle the flows have already been mixed. The liquid and gas are also not separately fed **through** the mixing chamber. "To" seems to be more appropriate.

If claims 7 and 9 are supposed to be alternatives claim 9 should not be independent on claim 7.

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

ZAHL, Adrian et al.
McFADDEN, FINCHAM
225 Metcalfe Street, Suite 606
Ottawa, Ontario K2P 1P9
CANADA

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of mailing (day/month/year) 06.06.2001	
Applicant's or agent's file reference 6321-1 PCT	REPLY DUE within 2 ¹ month(s) from the above date of mailing
International application No. PCT/CA00/00520	International filing date (day/month/year) 04/05/2000
Priority date (day/month/year) 06/05/1999	
International Patent Classification (IPC) or both national classification and IPC A62C13/64	
Applicant TERRA NOVA MARINE COMPANY LIMITED et al.	

1. This written opinion is the **second** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain document cited
 - VII ☒ Certain defects in the international application
 - VIII ☒ Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 06/09/2001.

Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer / Examiner Schut, T Formalities officer (incl. extension of time limits) Eich, M Telephone No. +49 89 2399 7578
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I. Basis of the opinion

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

Description, pages:

1,4-8 as originally filed

1a,2,2a,3 as received on 14/05/2001 with letter of 09/05/2001

Claims, No.:

1-22 as received on 14/05/2001 with letter of 09/05/2001

Drawings, sheets:

1/7-7/7 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

☐ the description, pages:

☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	
Inventive step (IS)	Claims	2
Industrial applicability (IA)	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V: Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The main difference between the prior art and the subject-matter of claim 1 is the fact that the apparatus comprises a container for holding a gas and liquid under pressure **together**. The word "together" should be used in the independent claims.

Claim 2

WO 97 02863 A mentions the possibility of a multiple way valve (p. 7, l. 13-16) as an alternative for separate valves for the gas and the liquid (p. 7, l. 10-12). It seems that this equivalent to a release valve comprising:

- - the release means is a single actuating means connected to first and second valves for simultaneously actuating said valves;
- a first valve for controlling and regulating the flow of liquid from a container to a first supply means; and
- a second valve for controlling and regulating the flow of gas from said container to a second supply means.

Since claim 2 does not contain any features concerning the layout of the valves which makes it possible to simultaneously release gas and liquid simultaneously from a container containing said liquid and gas together (see claim 3), the subject-matter of claim 2 basically defines a multiway valve and does not involve an inventive step.

Re Item VII: Certain defects in the international application

The mixing chamber is essential for the functioning of the apparatus and was included in original claim 11. Since claim 11 does not contain these features it does not meet the requirement following from Article 6 PCT that any claim must contain all the technical features essential to the invention.

Re Item VIII: Certain observations on the international application

The preamble of the independent claims should state that the container contains liquid and gas. The characterising portion should state that the container contains liquid and gas **together**. This emphasizes that the "together" is the distinguishing feature and

should be interpreted accordingly.

Claims 9 and 20

The expression "intermediate the other end of said bore" remains unclear. The expression "intermediate" either requires two locations ("intermediate ... and ...") or it requires a part of a certain length so that it defines a position in the middle. However, an "end" is a specific location without a length. See also claim 3 in which intermediate is used in a similar manner but with two locations. The fact that it is clear from the description where the passage (46) is located does not provide a justification for maintaining an expression which cannot be understood.

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 6321-1pct	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/CA 00/ 00520	International filing date (day/month/year) 04/05/2000	(Earliest) Priority Date (day/month/year) 06/05/1999
Applicant TERRA NOVA MARINE COMPANY LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/00520

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A62C13/64 A62C31/02 A62C39/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A62C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 02863 A (BROEMME ALBRECHT) 30 January 1997 (1997-01-30) page 5, last line -page 10, last line; figures ---	1-22
A	DE 197 24 339 A (JURKE STEFFEN) 5 February 1998 (1998-02-05) column 1, line 3 - line 38; figure ---	1-22
A	US 4 862 968 A (WOODMAN STUART D) 5 September 1989 (1989-09-05) column 2, line 18 -column 5, line 38; figures ---	1-22
A	DE 27 47 588 A (HAHN METALLBAU GMBH) 10 May 1979 (1979-05-10) page 8, line 4 -page 10, line 24; figures --- -/--	1-22

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

30 August 2000

Date of mailing of the international search report

07/09/2000

Name and mailing address of the ISA

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Authorized officer

Triantaphillou, P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/00520

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 314 354 A (BRITISH PETROLEUM CO PLC) 3 May 1989 (1989-05-03) column 7, line 57 -column 13, line 23; figures -----	1-22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 00/00520

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9702863	A	30-01-1997	DE 29510976 U	31-08-1995
			DE 29510982 U	21-09-1995
			AU 3564095 A	10-02-1997
DE 19724339	A	05-02-1998	NONE	
US 4862968	A	05-09-1989	CA 1305106 A	14-07-1992
DE 2747588	A	10-05-1979	NONE	
EP 0314354	A	03-05-1989	AT 91082 T	15-07-1993
			AU 2390588 A	04-05-1989
			CA 1332139 A	27-09-1994
			DE 3882112 A	05-08-1993
			DE 3882112 T	07-10-1993
			ES 2041318 T	16-11-1993
			JP 1164378 A	28-06-1989
			JP 2795444 B	10-09-1998
			KR 9701790 B	15-02-1997
			NO 174280 B	03-01-1994
			NZ 226630 A	25-06-1991
			US 5014790 A	14-05-1991
			ZA 8807745 A	27-06-1990

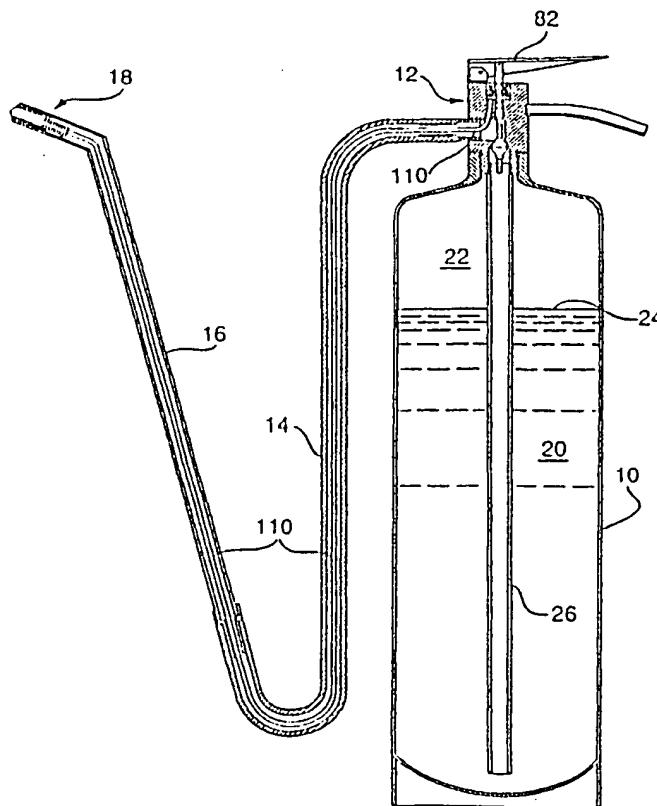
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : A62C 13/64, 31/02, 39/00	A1	(11) International Publication-Number: WO 00/67850 (43) International Publication Date: 16 November 2000 (16.11.00)
<p>(21) International Application Number: PCT/CA00/00520</p> <p>(22) International Filing Date: 4 May 2000 (04.05.00)</p> <p>(30) Priority Data: 09/306,017 6 May 1999 (06.05.99) US</p> <p>(71) Applicant (for all designated States except US): TERRA NOVA MARINE COMPANY LIMITED [CA/CA]; 119 Clyde Avenue, Mount Pearl, Newfoundland & Labrador A1N 4R9 (CA).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): HOPKINS, Gordon, Duane [CA/CA]; Terra Nova Marine Company Limited, 119 Clyde Avenue, Mount Pearl, Newfoundland & Labrador A1N 4R9 (CA).</p> <p>(74) Agents: ZAHL, Adrian et al.; McFadden, Fincham, Suite 606, 225 Metcalfe Street, Ottawa, Ontario K2P 1P9 (CA).</p>	<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>	

(54) Title: LIQUID MIST FIRE EXTINGUISHER

(57) Abstract

A liquid mist fire extinguisher, comprising a container for holding a gas and a liquid under pressure. The extinguisher has valve assembly at the upper end of the container, a valve for simultaneously releasing said gas and said liquid separately from the container, and a hose for feeding said gas and said liquid separately through a nozzle. The nozzle assembly includes means for feeding said gas and said liquid separately through a mixing chamber, and exiting orifices in an end surface of said nozzle assembly for issue of mixed gas and liquid in a fine mist.



LIQUID MIST FIRE EXTINGUISHER

FIELD OF INVENTION

This invention relates to a liquid mist fire extinguisher and more particularly a low pressure water atomizing fire extinguisher.

BACKGROUND TO THE INVENTION

Fires are classified as A, B, C or D as follows: Class A: ordinary combustibles; Class B: flammable liquids; Class C: electrical fires and Class D: flammable metals. Fire extinguishers are listed in Canada and the United States by ULC and UL respectively according to their effectiveness in suppressing the fires of the various classes. A standard extinguisher with an A:B:C rating for example, is effective in suppressing A, B and C class fires.

To achieve an A:B:C rating, extinguishers to date have used either dry chemicals or halon. The use of dry chemicals results in a messy and sometimes toxic cleanup. Halon is a clean alternative but has been banned by the Montreal Protocol on Substances that Deplete the Ozone Layer.

Water has also been used but prior art water extinguishers have not achieved an A:B:C rating. The standard water extinguisher for example discharges a solid stream of water from a pressurized canister and has a limited Class 2A rating.

Another type of known water extinguisher discharges a spray of water droplets and utilizes the same amount of water as the standard extinguisher. This extinguisher typically operates at about 100 psi. While this water extinguisher has been rated A:C, it does not generate the fine atomized mist required for a class B rating.

It is therefore an aspect of the present invention to provide an extinguisher in which water and air are stored together and are released simultaneously and separately to produce a fine liquid mist, capable of class A:B:C rating.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an apparatus for producing a fine liquid mist, characterized in that the apparatus includes a container for holding a gas and liquid under pressure, valve means for simultaneously releasing the gas and the liquid separately from the container, a nozzle including a mixing chamber and outlet orifices for emission of the liquid mist, the outlet orifices being at an end of the mixing chamber, feed means for feeding the gas and the liquid separately to the mixing chamber and the mixing chamber having two separate inlets at one end, a first inlet for injection of the liquid radially into the mixing chamber and a second inlet for injection of the gas axially into the mixing chamber for atomization of the liquid.

In another aspect of the present invention, there is provided a release valve for simultaneously releasing a gas and a liquid separately from a pressurized container containing the gas and liquid and to permit feeding the liquid and the gas as individual, separate fluid streams from the container and to and through the valve, characterized in that the release valve includes a first valve for controlling and regulating the flow of liquid from a container to a first supply means, a second valve for controlling and regulating the flow of gas from the container to a second supply means and a single actuating means connected to both valves for simultaneously actuating the valves.

In a further embodiment of the present invention, there is provided a liquid mist fire extinguisher, characterized in that the extinguisher includes a container for holding a gas and a liquid under pressure, a valve assembly at an upper end of the

container, valve means for simultaneously releasing the gas and the liquid separately from the container, a hose for feeding the gas and the liquid separately through a nozzle, the nozzle assembly including means for feeding the gas and the liquid separately through a mixing chamber and exiting orifices in an end surface of the nozzle assembly for issue of mixed gas and liquid in a fine mist.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross-section of a fire extinguisher according to the present invention;
Figure 2 is a cross-section of the valve structure at the top of the extinguisher of Figure 1, to a larger scale, and at right angles to that of Figure 1; with valve closed;
Figure 3 is a cross section similar to that of Figure 2, with valve open;
Figure 4 is a cross section of the valve structure, on the axis of the cross section of Figure 1;
Figure 5 is a longitudinal cross section through the nozzle;
Figure 6 is an end view on the end of the nozzle member, in the direction of arrow A.
Figure 7 is a cross-section of another embodiment of the valve structure of the present invention, on the axis of the cross-section Figure 1.
Figure 8 is a cross section of another embodiment of the valve structure of the present invention, on the axis of the cross section of Figure 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings illustrate a fire extinguisher assembly having an A, B and C rating comprising a pressure container 10 of, for example, an approximately 12L capacity having at its upper end a valve structure 12, and flexible hose 14 with a relatively ridged wand portion 16, and a nozzle assembly 18 at the end of the wand 16. The valve structure 12 closes the upper end of the container which, in use contains a liquid, for example, water, at its lower portion 20 and a pressurizing gas, for

example, air at its upper portion 22, the gas/liquid in the phase shown at 24. A tube 26 extends down and from the valve structure 12 towards the bottom of container, finishing a short distance above the bottom. The tube is connected at its upper end to the valve structure 12.

Figures 2 and 3 show specifically the valve structure indicated by reference numeral 12. It comprises a main body 30, which is attached by a fitted threaded connection 32 to a neck portion 34 at the upper part of container 10. The body 30 has a central longitudinal extending bore, having a varying dimension along its length. At its lower end 36, the bore is enlarged and receives the upper end of the tube 26, conveniently provided with a threaded connection. The bore tapers inwardly to form a valve seat 38 of a first valve. The bore enlarges, at 40, to form a fluid passage, described later in connection with Figure 4. Above the enlargement 40, the bore decreases in size to form an elongate tubular seating at 42. Above the tubular seating 42, the bore is enlarged and a plug 44 is inserted to close off the bore, and also to form a chamber which serves as a transfer passage 46, again described in more detail with respect to Figure 4. The plug 44 has a central bore 48 and extending through the bore is an elongate valve member or stem 60. At its lower end, the valve stem 60 has a tapered valve member or seal 62, which cooperates with tapered valve seat 38. At an intermediate position, there is provided a second valve comprised of an extended valve portion 64 which cooperates with the tubular seating 42.

The first valve comprised of valve member or seal 62 and valve seat 38 acts to control flow of liquid from container. The second valve formed of the upper end of the valve portion 64 acts with the upper end of seating 42 to control flow of gas from the container 10.

A further bore 70 extends up through the body 30 and connects to a radial bore 72 extending to the central bore to form a port 76, between the enlargement 40 and the passage 46. The outer end of the radial bore 72 is closed by a plug 78 which can

be used to provide a connection to a pressure gauge. Considering the valve portion 64, a reduced diameter portion 66 on the valve member 60 connects with the passageway 46 only, in a closed position, as in Figure 2, and connects passageway 46 with port 76, in an open position, as in Figure 3.

The upper end 80 of the valve member 60 extends beyond the plug 44. A lever 82 (see Figure 1) is pivotally mounted on the end of the stem 60 and extends over the outer end 80. A compression spring 81 is mounted on the outer end 80 of the valve member 60 to bias the valve member to a closed position. Pressure by the lever 82 on the outer end 80 of the valve member 60 will open both valves simultaneously. Various seals are provided for the valve member 60. An O-ring 84 is provided between the passage 46 and the upper end surface of the body 30, in the example of the plug 44, to prevent leakage from the top end or upper surface of the body 30. O-rings 86 and 88 are spaced apart to prevent leakage from port 76 to the passage 46 and enlargement 40 in the valve closed position, and to prevent leakage from the port 76 to the enlargement 40 in the valve open position. O-rings 100 and 107 can be provided in a conventional manner, such as to seal threaded connections 32 and the threaded connection between the plug 44 and the upper end of the body 30.

Figure 4 illustrates the attachment of the flexible hose 14 to the valve body 30, with connections to the enlargement 40, and also connection of a flexible tube 110, inside the hose 14 to the passage 46. The hose 14 is connected to the body 30 via a threaded connection 112 in a bore 114 connecting to the enlargement 40. The tube 110 extends up through a bore 116 in the top part of the body 30 to connect to the passage 46. As seen in Figure 1, the tube 110 extends through the hose 14 and wand 16 to a nozzle assembly 18.

When the valves are closed, neither the liquid nor gas can flow from the container 10 to the nozzle assembly 18. Pushing down on the lever 82 opens the valves to a position as seen in Figure 3. Liquid escapes up past the lower end of the valve member 60 into the enlargement 40 and up through bore 114 and connection 112

into the hose 14. Simultaneously, air escapes through bores 70 and 76, recess 66, passage 46 and then through the tube 110 to nozzle 18.

One form of nozzle assembly 18 is illustrated in Figure 5. This assembly has a nozzle member 120 attached to the end of the wand 16 and an internal intermediate support member 122 to which the tube 110 is connected. The member 122 includes an orifice or bore 128 formed internally of the member 122, and can be, e.g., 0.75-1.5 mm in diameter.

The member 122 is connected to the nozzle member 120 forming an axial hollow or mixing chamber 126. A passage 124 provides access, via a port 125, to a mixing chamber 126 for the liquid in the wand 16. Port 125, can be, e.g., 2 - 3.5 mm in diameter. Liquid enters the mixing chamber 126 through the port 125 at right angles to the longitudinal axis of the nozzle 18. Gas flows through bore 128 of the member 122 into the mixing chamber 126 and interreacts with the liquid, for effective atomization of the liquid.

The nozzle member 120 is circular in cross section, and has a closed end with a number of orifices 132. One arrangement is seen in Figure 6. The nozzle member 120, at one end of the nozzle assembly 18 has, when seen in cross section (Figure 5) with respect to the longitudinal axis, an angled face 130, the angle being preferably in the range of 60° to 75°.

The gas enters the mixing chamber in a longitudinal direction and combines with the jet of liquid that is entering the mixing chamber at port 125. Thus, this will produce a gas/liquid mixture. The mixture exits the chamber 126 through the orifices 132, resulting in further expansion and further atomization of the liquid. The orifice pattern 132 combined with the amount of atomization and end face angles produces the described mist pattern.

To charge the container 10, about 6L of liquid, for example water is placed in the

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container. The gas, for example air, is fed into the upper part of the container 10 through the wand 16 by removing the nozzle 120 and replacing it with an air valve (not shown). The gas source means is connected to the air valve, the valves are opened and air is fed into the container 10. After pressurization, the nozzle is replaced. Pressurization in this manner minimizes later tampering. As an alternative, the gas is fed through bore 72 by removing plug 78. As a further alternative, a pressure gauge can be permanently mounted at the bore 72, and this can be provided with a T-shaped valved connection having an air valve for connection of a pressurized source of gas. The gas is generally pressurized initially to a maximum pressure of about 175 pounds per square inch.

Figure 7 illustrates an alternate embodiment of the valve structure 12. The central longitudinal extending bore above enlargement 40 is not enlarged, eliminating the need for a plug such as plug 44 (see Figure 4) to close off the bore. The bore 116 extends through the top of the valve body 30. The top of the bore 116 is closed by a plug 31. A second bore 33 serves as a transfer passage in place of the chamber 46 (see Figure 4), and is closed by plug 37. The valve structure 12 is otherwise the same as the previous embodiment including the tube 110 which extends up through bore 116.

Figure 8 illustrates a further alternative embodiment of the valve structure 12. The central longitudinal extending bore above enlargement 40 is not enlarged eliminating the need for a plug such as plug 44 (see Figure 4) to close off the bore. Also eliminated is bore 116 (see Figure 7). A bore 33 serves as a transfer passage in place of the transfer passage or chamber 46 (see Figure 4), and is connected through a connection 112A to a flexible hose 14A. As with previous embodiments of the present invention, when the valves are closed, neither the liquid nor gas can flow from the container 10. In use, with similar components described above, pushing down on a lever opens the valves whereby liquid escapes up past the lower end of the valve member into the enlargement and up through the connection and into the hose. Simultaneously, air escapes through suitable bores or the like,

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through a transfer passage and then through the connection 112A to the hose 14A.

A carrying handle can be attached through the valve structure 12 as seen in Figure 1. The container is shaped so that such can normally stand upright on a surface.

Although embodiments of the invention have been described above, it is not limited thereto and it will be apparent to those skilled in the art that numerous modifications form part of the present invention insofar as they do not depart from the spirit, nature and scope of the claimed and described invention.

I CLAIM

1. An apparatus for producing a fine liquid mist, characterized in that :
 - a container (10) for holding a gas and liquid under pressure;
 - valve means (12) for simultaneously releasing said gas and said liquid separately from said container (10);
 - a nozzle (18) including a mixing chamber (126) and outlet orifices (132) for emission of said liquid mist, said outlet orifices (132) being at an end of said mixing chamber (126);
 - feed means (14) for feeding said gas and said liquid separately to said mixing chamber; and
 - said mixing chamber (126) having two separate inlets at one end, a first inlet (125) for injection of said liquid radially into the mixing chamber and a second inlet (128) for injection of said gas axially into said mixing chamber (126) for atomization of said liquid.
2. A release valve for simultaneously releasing a gas and a liquid separately from a pressurized container containing said gas and liquid and to permit feeding said liquid and said gas as individual, separate fluid streams from said container and to and through said valve, characterized in that :
 - a first valve (62) for controlling and regulating the flow of liquid from a container (10) to a first supply means (112);
 - a second valve (64) for controlling and regulating the flow of gas from said container (10) to a second supply means (110) ; and
 - a single actuating means (82) connected to both valves for simultaneously actuating said valves.
3. A release valve according to claim 2, comprising an elongate valve member

- (60), and spaced apart valve seats (38, 42), said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position intermediate the other end of said valve member (60) and said first valve (62), said means (82) for actuating said valves positioned at the other end of said valve member (60).
4. A release valve according to claim 3, further comprising an enlargement at said one end, movable axially to open and close an orifice.
 5. A release valve according to claim 4, further comprising a reduced section at said intermediate position, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
 6. A release valve according to claim 5, comprising a valve body (30), said elongate member (60) positioned in a bore in said valve body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in said bore.
 7. A release valve according to claim 6, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the other end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means for feeding said gas from said chamber (46) to said outlet.
 8. A release valve according to claim 7, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
 9. A release valve according to claim 8, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a transfer passage (46) in said body (30) at a position intermediate the other end of said bore, said

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reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said transfer passage (46) to said outlet.

10. A release valve according to claim 9, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
11. A liquid mist fire extinguisher, characterized in that:
 - a container (10) for holding a gas and a liquid under pressure;
 - a valve assembly (12) at an upper end of said container (10);
 - valve means (62,64) for simultaneously releasing said gas and said liquid separately from said container (10);
 - a hose (14) for feeding said gas and said liquid separately through a nozzle (18); said nozzle assembly (18) including means for feeding said gas and said liquid separately through a mixing chamber (126), and exiting orifices (132) in an end surface (130) of said nozzle assembly (18) for issue of mixed gas and liquid in a fine mist.
12. A fire extinguisher as claimed in claim 11, including a gas conveying tube (110) within said hose (14) for feeding said gas.
13. A fire extinguisher as claimed in claim 12, said valve means (60) comprising a first valve (62) controlling a liquid outlet from said container (10), a second valve (64) controlling a gas outlet from said container (10), means (14) for feeding said liquid and said gas separately from said valves, and means (82) for actuating said valves simultaneously.
14. A fire extinguisher as claimed in claim 13, said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position

intermediate at the other end of said valve member (60) and said first valve (62), said means (82) for actuating the said valves simultaneously positioned at the other end of said valve member (60).

15. A fire extinguisher as claimed in claim 14, further comprising an enlargement at said one end, movable axially to open and close an orifice.
16. A fire extinguisher as claimed in claim 15, further comprising a reduced section at said intermediate position, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
17. A fire extinguisher as claimed in claim 16, comprising a valve body (30), an elongated member (60) positioned in a bore in said body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in a said bore.
18. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the outer end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means (70) for feeding said gas from said chamber (46) to said outlet.
19. A fire extinguisher as claimed in claim 18, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
20. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a transfer passage (46) in said body (30) at a position intermediate the outer end of said bore, said reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said

-13-

transfer passage (46) to said outlet.

21. A fire extinguisher as claimed in claim 20, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
22. A fire extinguisher according to claim 11, wherein said nozzle assembly (18) includes an angled face (130) at one end.

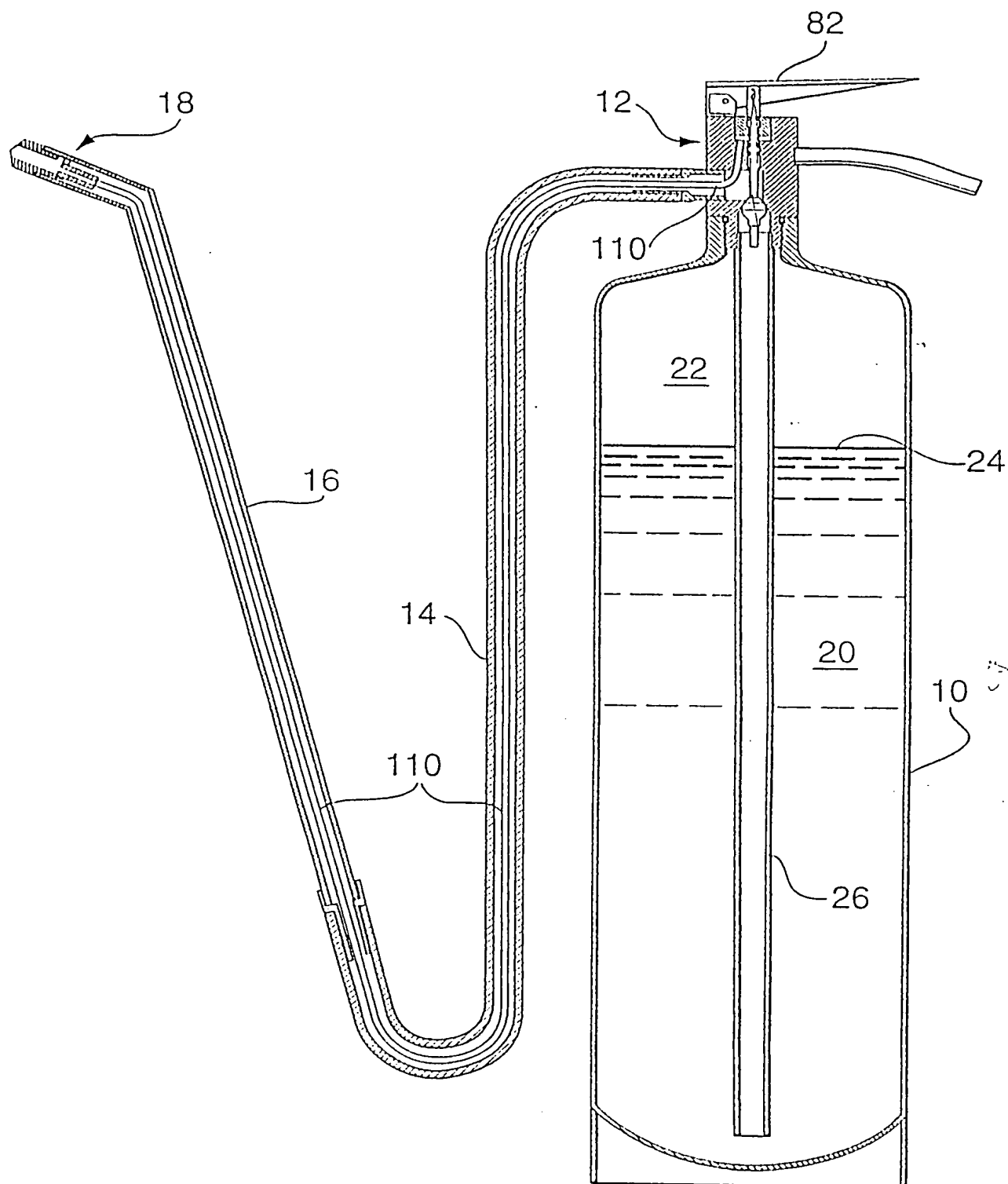


FIG. 1

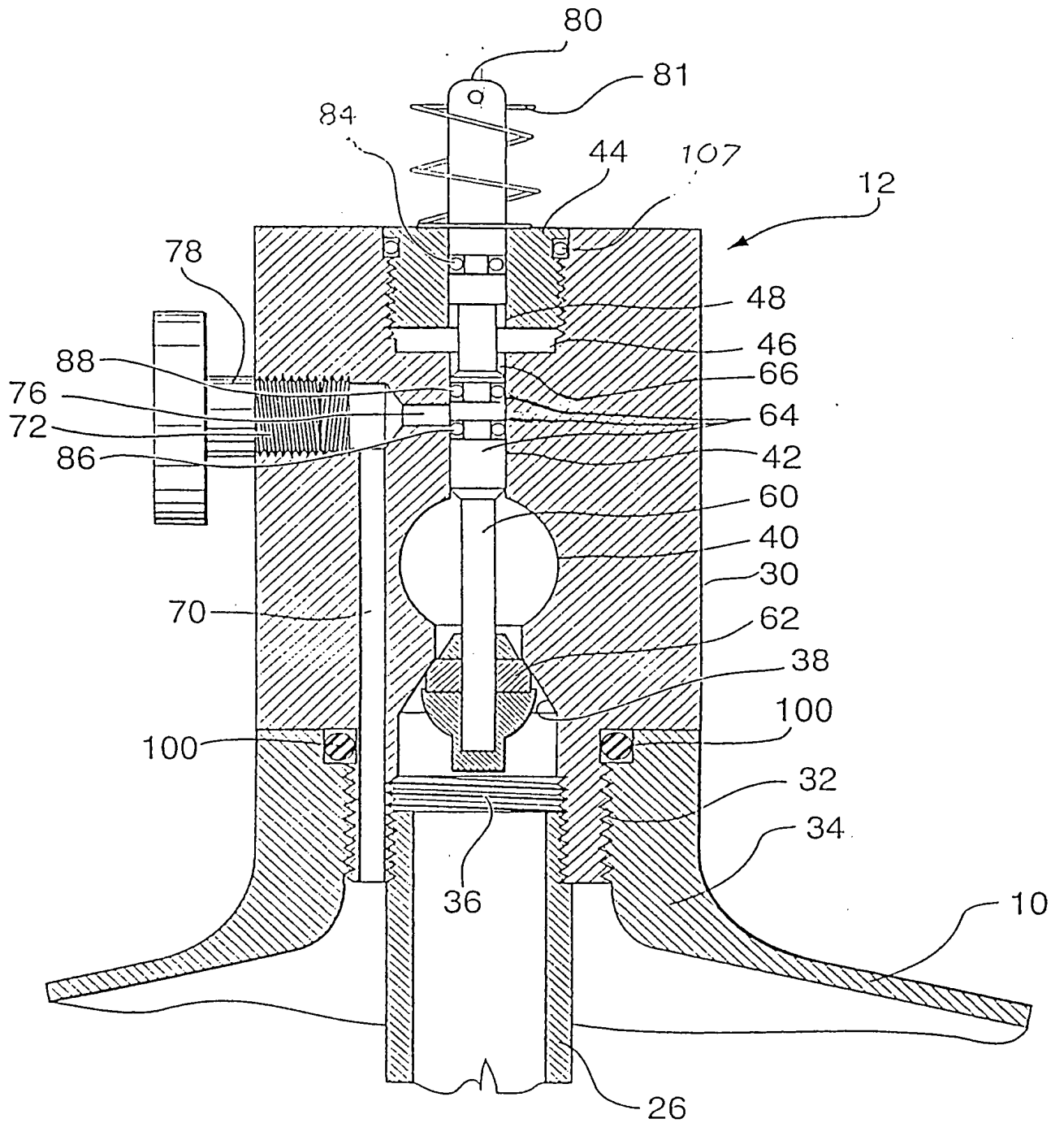


FIG. 2

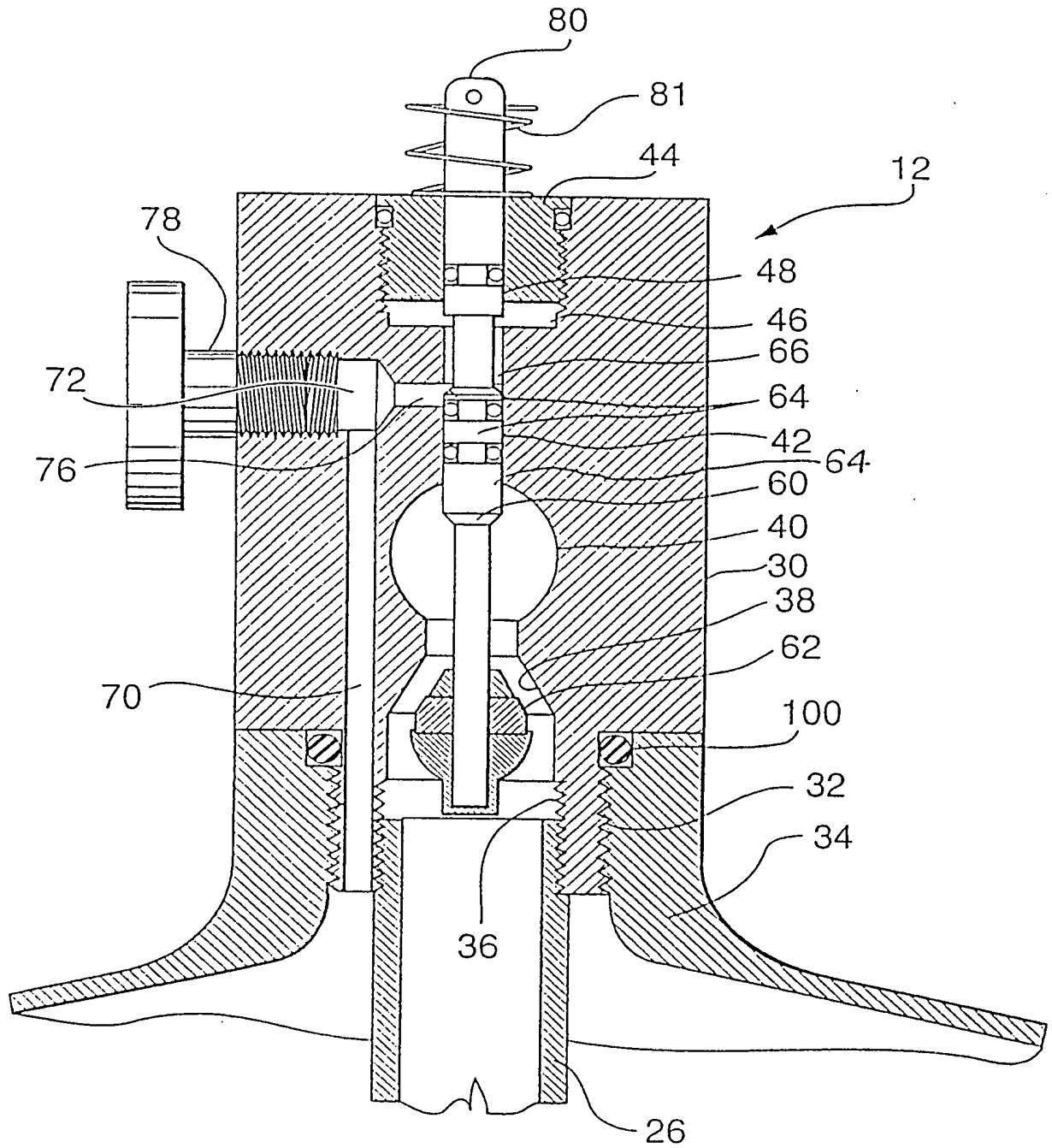
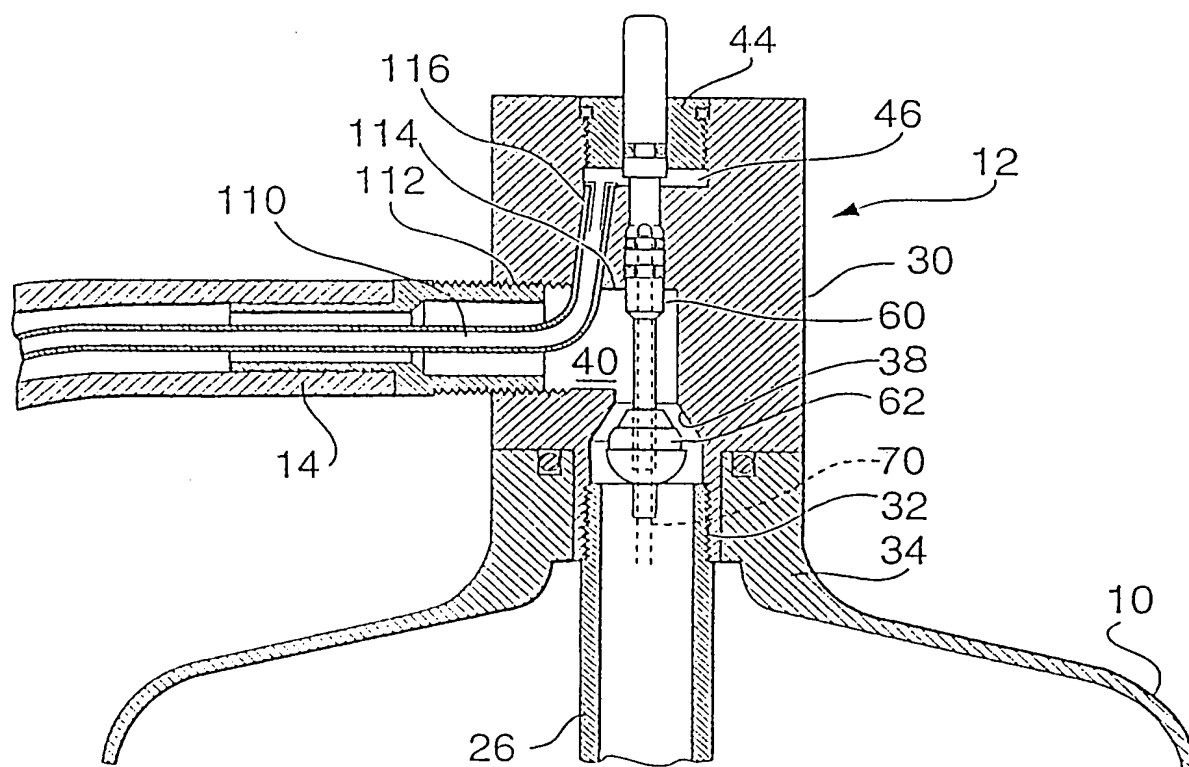


FIG. 3



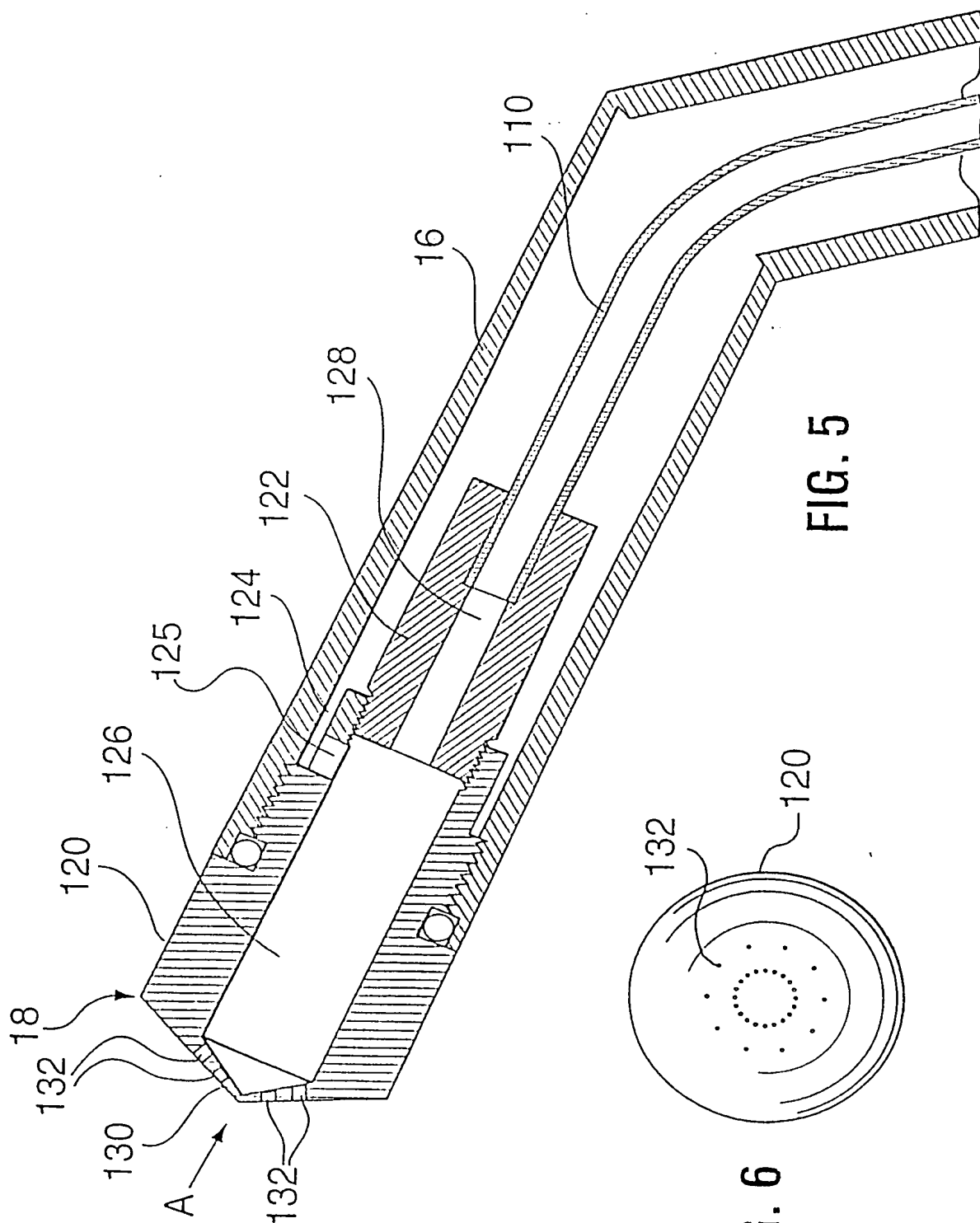


FIG. 5

FIG. 6

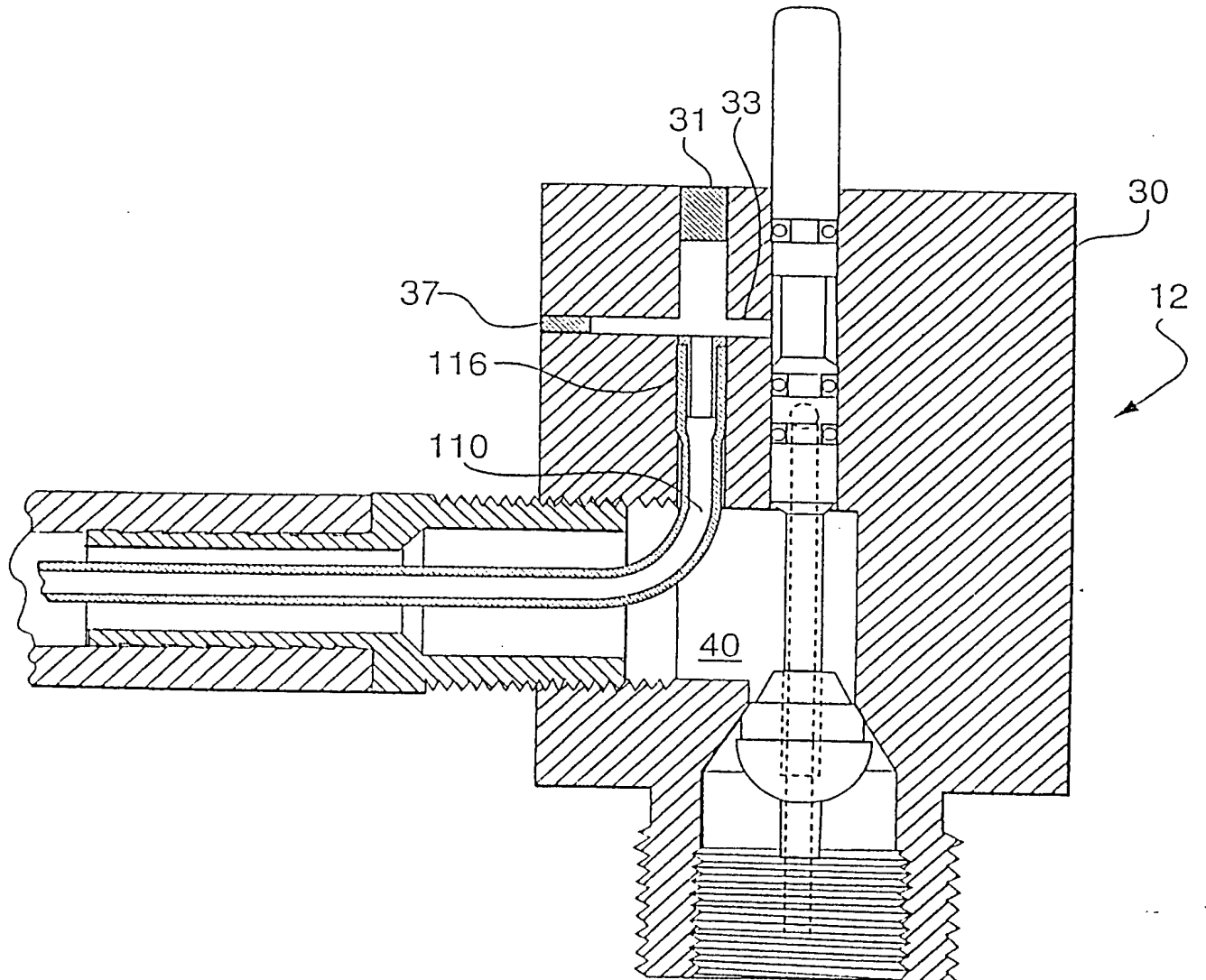


FIG. 7

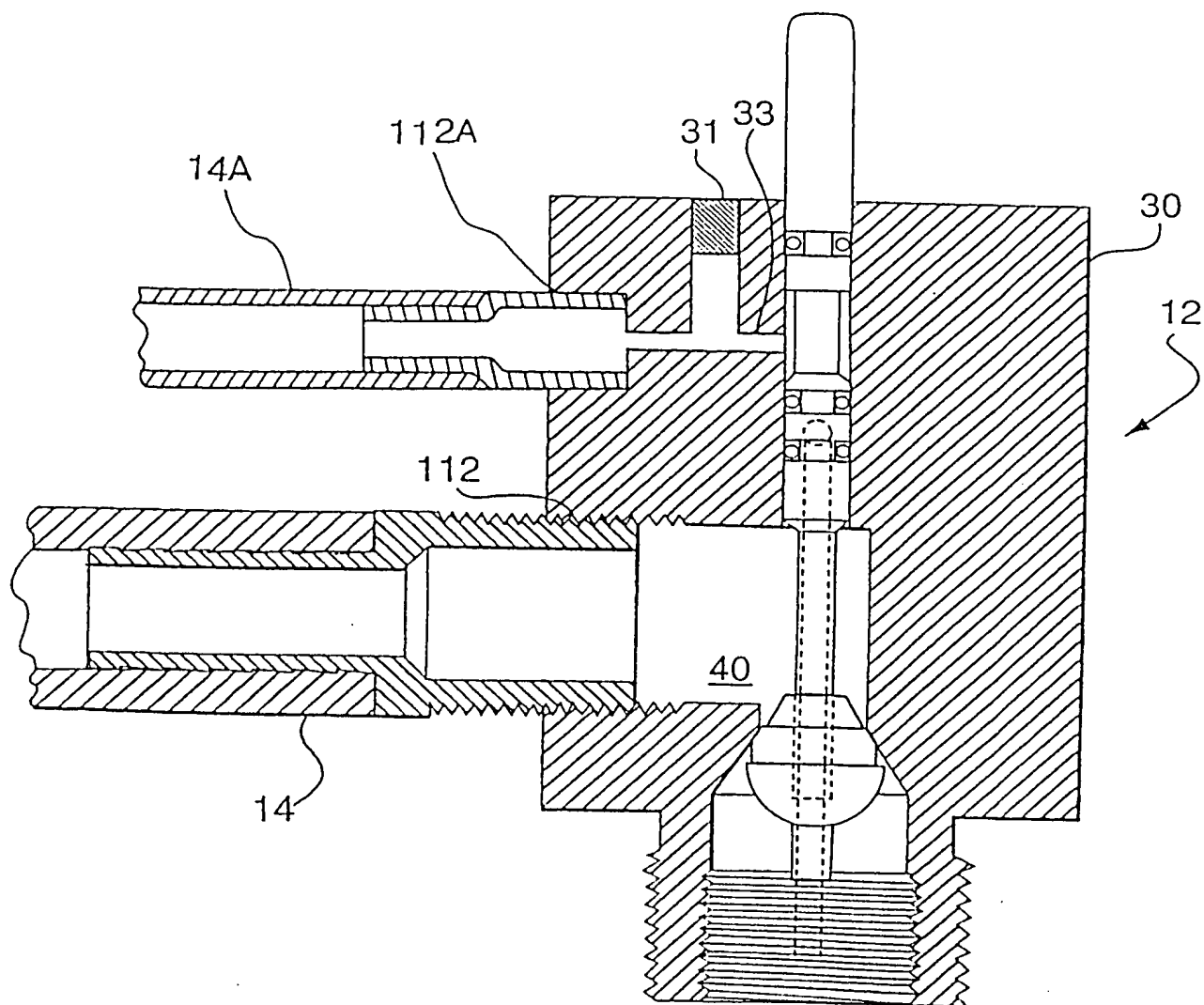


FIG. 8

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 00/00520

A CLASSIFICATION OF SUBJECT MATTER
IPC 7 A62C13/64 A62C31/02 A62C39/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A62C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 02863 A (BROEMME ALBRECHT) 30 January 1997 (1997-01-30) page 5, last line -page 10, last line; figures	1-22
A	DE 197 24 339 A (JURKE STEFFEN) 5 February 1998 (1998-02-05) column 1, line 3 - line 38; figure	1-22
A	US 4 862 968 A (WOODMAN STUART D) 5 September 1989 (1989-09-05) column 2, line 18 -column 5, line 38; figures	1-22
A	DE 27 47 588 A (HAHN METALLBAU GMBH) 10 May 1979 (1979-05-10) page 8, line 4 -page 10, line 24; figures	1-22
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

30 August 2000

Date of mailing of the international search report

07/09/2000

Name and mailing address of the ISA

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Authorized officer

Triantaphillou, P

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 00/00520

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9702863	A	30-01-1997	DE 29510976 U DE 29510982 U AU 3564095 A	31-08-1995 21-09-1995 10-02-1997
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DE 2747588	A	10-05-1979	NONE	
EP 0314354	A	03-05-1989	AT 91082 T AU 2390588 A CA 1332139 A DE 3882112 A DE 3882112 T ES 2041318 T JP 1164378 A JP 2795444 B KR 9701790 B NO 174280 B NZ 226630 A US 5014790 A ZA 8807745 A	15-07-1993 04-05-1989 27-09-1994 05-08-1993 07-10-1993 16-11-1993 28-06-1989 10-09-1998 15-02-1997 03-01-1994 25-06-1991 14-05-1991 27-06-1990

10/019367
531 Rec'd PCT 01 NOV 2001

File No.: 6321-1PCT

Ottawa, Ontario
July 30, 2001

In Application of:

Terra Nova Marine Company, Limited et al.

For	:	LIQUID MIST FIRE EXTINGUISHER
International Application No.	:	PCT/CA 00/00520
International Filing Date	:	May 04, 2000
International Patent Class.	:	A62C 13/64
Authorized Officer/Examiner	:	Schut, T.

TO: European Patent Office
D-90298 Munich

RESPONSE TO SECOND WRITTEN OPINION

Sir:

This responds to the Second Written Opinion dated June 06, 2001. In accordance with Rule 66.3, please amend the application as follows:

IN THE SPECIFICATION:

Kindly replace page 2 with amended page 2 submitted herewith.

IN THE CLAIMS:

Replace the claims pages now on file, with amended claims pages 9 to 15, bearing amended claims 1 through 22, submitted herewith.

European Patent OfficeIntl. Application No. PCT/CA 00/00520**REMARKS:**

Applicant respectfully draws to the Examiner's attention that this amendment has been filed in accordance with a telephone conversation on July 10th, 2001 between the Agents for the Applicant and Formalities Officer M. Eich, during which a request and authorization for a time limit extension was obtained in which to reply to the present Second Written Opinion. A copy of our confirmatory facsimile to Ms M. Eich is enclosed.

The specification has been amended on replacement page 2 submitted herewith in order to adapt the description under Rule 5.1(a)(iii) to the amended claims.

Re. Item V.

Concerning the amendments to the claims, Applicant notes with appreciation the Examiner's suggestions regarding the proposed term for inclusion into Claim 1. Per the Examiner's suggestion, Applicant has amended Claim 1 to include the term "together" to further define a difference between the prior art and the subject matter of claim 1. Similar comments apply with respect to amended claims 2 and 11.

With respect to the Examiner's comments regarding claim 2, Applicant has amended claim 2 to include features concerning the layout of the valves which makes it possible to simultaneously release gas and liquid simultaneously from a container. Applicant now believes that the amended claim submitted herewith does define and provide an inventive step over the teachings of the prior art.

European Patent Office

Intl. Application No. PCT/CA 00/00520

Re. Item VII.

With respect to the Examiner's comments under Item VII, Applicant draws to the Examiner's attention that claim 11 has been amended in accordance with Rule 6.3(b).

More specifically, with respect to Examiner's comments under Item VII, Applicant has amended the claim to include the technical features of originally filed claim 11.

Re. Item VIII.

With respect to the Examiner's comments under Item VII, Applicant draws to the Examiner's attention that the independent claims (1, 2 and 11) have been amended in accordance with Rule 6.3(b).

More specifically, With respect to Examiner's comments under Item VIII, the preamble of the independent claims have been amended to state that the container contains both a liquid and a gas, and as noted above, includes the Examiner's suggested term "together" to better define the distinguishing features of the present invention.

With respect to claims 9 and 20, Applicant has amended the claims to replace and properly define the expression "intermediate the other end of said bore."

More specifically, Applicant has amended the above expression to read "intermediate the ends of said bore", which would impart to a reader skilled in the relevant art to understand that the passage (46) is positioned intermediate or

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Intl. Application No. PCT/CA 00/00520

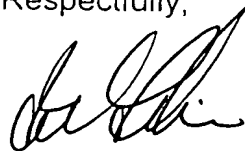
between the ends of said bore. With respect to the present application, one example for support is found for the amended claims on page 4, second paragraph (Figures 2 and 3), where :

"the body 30 includes a central longitudinally extending bore having a varying dimension along its length. At its lower end 36.....[and further] Above tubular seating 42, the bore is enlarged and a plug 44 is inserted to close off the bore.....".

As would be understood by those skilled in the art per the above example, the bore includes a lower end (36) while the other end is "closed off" by a plug 44. As such it would be readily understood by one skilled in the art that the bore includes a length, and (as per the above) is open at either end. The phrase "intermediate the ends" (as it now reads in amended claims 9 and 20), would thus imply that the passageway 46 would be positioned at a point that is approximately midway or generally centrally located between the ends of the bore.

In light of the above amendments, a favourable International Preliminary Examination Report is anticipated.

Respectfully,



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Encl.

Amended claims (pages 9 to 15)
Replacement page 2
Copy of facsimile to M. Eich

water and air are stored together and are released simultaneously and separately to produce a fine liquid mist, capable of class A:B:C rating.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an apparatus for producing a fine liquid mist, characterized in that the apparatus includes a container for holding a gas and liquid together under pressure, valve means for simultaneously releasing the gas and the liquid separately from the container, a nozzle including a mixing chamber and outlet orifices for emission of the liquid mist, the outlet orifices being at an end of the mixing chamber, feed means for feeding the gas and the liquid separately to the mixing chamber and the mixing chamber having two separate inlets at one end, a first inlet for injection of the liquid radially into the mixing chamber and a second inlet for injection of the gas axially into the mixing chamber for atomization of the liquid.

In another aspect of the present invention, there is provided a release valve for simultaneously releasing a gas and a liquid separately from a pressurized container containing the gas and liquid together and to permit feeding the liquid and the gas as individual, separate fluid streams from the container and to and through the valve, characterized in that the release valve includes a first valve for controlling and regulating the flow of liquid from a container to a first supply means, a second valve for controlling and regulating the flow of gas from the container to a second supply means and a single actuating means connected to a valve member including spaced apart first and second valves for simultaneously actuating the valves.

In a further embodiment of the present invention, there is provided a liquid mist fire extinguisher, characterized in that the extinguisher includes a container for holding a gas and a liquid together under pressure, a valve assembly at an upper end of the container, valve means for simultaneously releasing the gas and the liquid separately from the container, a hose for feeding the gas and the liquid separately

I CLAIM

1. An apparatus for producing a fine liquid mist, comprising a container (10) for holding a gas and liquid together under pressure, valve means (12) for releasing said gas and said liquid from said container (10); a nozzle (18), feed means (14) operatively connecting said nozzle and said container, and a mixing chamber (126) in the nozzle, said mixing chamber (126) having outlet orifices (132) for emission of said liquid mist, said outlet orifices (132) being at a discharge end of said mixing chamber (126),

c h a r a c t e r i z e d in that

said container having actuation means for simultaneously actuating first and second valve means, said actuation means comprising a single actuation lever for simultaneously opening and closing both of said valve means;

said valve means comprising a first valve (62) for controlling and regulating the flow of liquid from a container (10) to a first supply means (112) and a second valve (64) for controlling and regulating the flow of gas from said container (10) to a second supply means (110) ; wherein simultaneous release of said liquid and said gas is achieved when said single actuating lever (82) is displaced whereby movement of each of said first and second valves occurs, and wherein

said mixing chamber (126) includes two separate inlets at one end, a first inlet (125) for injection of said liquid radially into the mixing chamber and a second inlet (128) for injection of said gas axially into said mixing chamber (126) for atomization of said liquid.

2. A release assembly for simultaneously releasing a gas and a liquid separately from a pressurized container containing said gas and liquid together and to permit feeding said liquid and said gas as individual, separate fluid streams from said container and to and through said valve, characterized in that :

the release assembly is a single actuating means (82) connected to a valve member including spaced apart first and second valves for simultaneously actuating said valves,

said first valve (62) for controlling and regulating the flow of liquid from a container (10) to a first supply means (112);

said second valve (64) for controlling and regulating the flow of gas from said container (10) to a second supply means (110) ; and

whereby movement of said single actuating means effects simultaneous opening and closing of said valves to effect control and regulation of said simultaneous flow of said liquid and said gas from said valves.
3. A release valve according to claim 2, comprising an elongate valve member (60), and spaced apart valve seats (38, 42), said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position intermediate the other end of said valve member (60) and said first valve (62), said means (82) for actuating said valves positioned at the other end of said valve member (60).
4. A release valve according to claim 3, further comprising an enlargement at

said one end, movable axially to open and close an orifice.

5. A release valve according to claim 4, further comprising a reduced section at said intermediate position of said valve member 60, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
6. A release valve according to claim 5, comprising a valve body (30), said elongate member (60) positioned in a bore in said valve body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in said bore.
7. A release valve according to claim 6, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the other end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means for feeding said gas from said chamber (46) to said outlet.
8. A release valve according to claim 7, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
9. A release valve according to claim 8, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a transfer

passage (46) in said body (30) at a position intermediate the ends of said bore, said reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said transfer passage (46) to said outlet.

10. A release valve according to claim 9, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).

11. A liquid mist fire extinguisher, comprising a container (10) for holding a gas and a liquid together under pressure, a valve assembly (12) at an upper end of said container (10) for releasing said gas and said liquid from said container (10), a hose and a nozzle assembly (18) and a mixing chamber (126), characterized in that

the extinguisher has a single actuating means (82) for simultaneous release of said liquid and said gas by simultaneously actuating first and second valve means (62, 64), said actuating means controlling spaced apart first and second valves (62, 64); and

wherein said valve means (62,64) simultaneously releases said gas and said liquid separately from said container (10), said first valve means (62) controlling and regulating the flow of liquid from a container (10) and said second valve (64) controlling and regulating the flow of gas from said container (10).

12. A fire extinguisher as claimed in claim 11, including a gas conveying tube (110) within said hose (14) for feeding said gas.
13. A fire extinguisher as claimed in claim 12, said valve means (60) comprising a first valve (62) controlling a liquid outlet from said container (10), a second valve (64) controlling a gas outlet from said container (10), means (14) for feeding said liquid and said gas separately from said valves, and means (82) for actuating said valves simultaneously.
14. A fire extinguisher as claimed in claim 13, said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position intermediate at the other end of said valve member (60) and said first valve (62), said means (82) for actuating the said valves simultaneously positioned at the other end of said valve member (60).
15. A fire extinguisher as claimed in claim 14, further comprising an enlargement at said one end, movable axially to open and close an orifice.
16. A fire extinguisher as claimed in claim 15, further comprising a reduced section at said intermediate position, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
17. A fire extinguisher as claimed in claim 16, comprising a valve body (30), an

elongated member (60) positioned in a bore in said body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in a said bore.

18. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the outer end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means (70) for feeding said gas from said chamber (46) to said outlet.
19. A fire extinguisher as claimed in claim 18, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
20. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a transfer passage (46) in said body (30) at a position intermediate the ends of said bore, said reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said transfer passage (46) to said outlet.
21. A fire extinguisher as claimed in claim 20, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).

22. A fire extinguisher according to claim 11, wherein said nozzle assembly (18) includes an angled face (130) at one end.

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531 Re PCT/PTC 01 NOV 2001

File No.: 6321-1PCT

Ottawa, Ontario
May 09, 2001

In Application of:

Terra Nova Marine Company, Limited et al.

For	:	LIQUID MIST FIRE EXTINGUISHER
International Application No.	:	PCT/CA 00/00520
International Filing Date	:	04 May 2000 (04.05.2000)
International Patent Class.	:	A62C 13/64
Authorized Officer/Examiner	:	Schut, T.

TO: European Patent Office
International Preliminary Examining Authority
D-80298 Munich
Germany

RESPONSE TO WRITTEN OPINION

Sir:

This responds to the Written Opinion dated February 12, 2001. In accordance with Rule 66.3, please amend the application as follows:

IN THE DESCRIPTION:

Kindly add page 1A to the specification, and kindly replace pages 2 and 3 with amended pages 2, 2A and 3 submitted herewith.

IN THE CLAIMS:

Replace the claims pages now on file, with amended claims pages 9 to 15, bearing amended claims 1 through 22, submitted herewith.

European Patent OfficeIntl. Application No. PCT/CA 00/00520**REMARKS:**

The specification has been amended at page 1A to refer to the art cited by the Examiner.

The specification has also been amended at pages 2, 2A and 3, in order to adapt the description under Rule 5.1(a)(iii) to the amended claims.

Concerning the amendments to the claims, Claim 1 has been amended to further define the first and second valves. The original disclosure, at page 4 et seq., refers to a valve structure 12, which is descriptive of the valve structure now recited in the claims. This amendment is supported at pages 4, first full paragraph, page 5, first full paragraph, and page 7, second and third full paragraphs of the original specification. Similar comments apply with respect to amended claims 2 and 11.

Claims 5, 9 and 11 have also been amended in response to the Examiner's observations under Item VIII. These amendments are discussed in greater detail below.

Re. Item V.

Turning to the Examiner's objection to claims 1, 2, 10, 11, 12, 13, and 21, under Item V, the Examiner is requested to consider the following comments.

The present invention is directed (in one aspect) to a fire extinguisher using conventional pressurized air and a liquid such as water to generate a fine mist.

The present invention has been successfully tested to extinguish fires of classes A, B and C, which at least in Canada, has never been accomplished previously with air pressurized water extinguishers. The structure which enables applicant's extinguisher to achieve these results includes a single container containing both the propellant and liquid, a pair of valves, one for the propellant and another for the pressurized liquid, a single actuating means for both valves whereby the liquid and propellant are simultaneously dispersed and finally, a nozzle having a mixing chamber to generate the fine droplet/mist stream for extinguishing fires. Reference made be had to Figures 2, 3 and 5 of applicant's application showing a typical structure of the present invention, including the dual valve with a single actuation means and the mixing chamber in the nozzle and with radial injection of the air.

WO 97/02863 discloses a specialized extinguisher which is basically intended to generate frozen droplets in the nozzle in order to permit the spray to be ejected to a greater distance. The extinguisher includes an outer container 50, a separate interior container 59' for the gaseous propellant such as carbon dioxide and finally a separate container 59 for the water. A master control valve in the handle is connected to a lever 53 and to the two containers for the propellant and liquid. The spray nozzle 55 is attached to the control valve 52 (see page 6, lines 1 et seq.).

As shown in Figures 2 and 3 of this reference, tube 11 for the propellant is provided with a valve 12; liquid lines 15 and 15' each have further separate valves 12' and 12". In other words, there are four valves to control the opening and closing of the two separate streams and to provide flow control.

All of these four valves are used in combination one with another in order to control "... velocities of flow of the extinguishing water and gas .. (which) are synchronized with one another". The reference teaches that these features are essential (i.e. the coordination of the four valves, in order to open and close the fluid control pressure and flow conditions relative to one another in order to permit the carbon dioxide to cause the water droplets to freeze (see pages 9, fourth paragraph and indented points, and page 10)).

From this reference, compared to applicant's claimed invention, applicant employs a single valve on each of the gaseous and liquid streams from a single container, with single actuating means that simultaneously release both the propellant and liquid. There is no teaching or even suggestion, that the reference employs this principal and indeed, the reference clearly does not suggest this possibility. The reference, by teaching the use of two valves for each stream to control the gaseous and liquid streams, clearly teaches away from the concept of applicant's invention. If the reference had even remotely conceived of applicant's development, then there would be absolutely no use for the multiple valves for each flow stream. In the absence of any such suggestion, it is clear that applicant's invention is not taught and is clearly patentable over such teachings.

It is also noted in the reference that control valve 52 is described as a "multi-way valve". This is clear evidence that the reference does not contemplate an extinguisher with a valve and simultaneous actuating structure contemplated by applicant. A multi-way valve would be a single valve with two separate conduits leading to the valve so that actuation such as in an on/off direction would simply be opening or closing the multi conduit in such a single valve with a handle or the like.

Notwithstanding the above, Applicant notes that in further contrast to WO 97 02863, the nozzle assembly as disclosed by Richter teaches that the carbon dioxide gas exits from the main tube 11 as noted in Figures 2 and 3, and with the extinguishing liquid 15 entering from the sides into the gas stream, more particularly the Examiner will note that the reference teaches and illustrates that the liquid is injected in to the mixing chamber at approximately a 45 degree entry configuration . This would appear to be required given the teaching of the reference and leads to a different mixing concept compared to applicant's disclosed and claimed invention.

In Applicant's invention, the main tube supplies the water to the nozzle and mixing chamber in the nozzle in a radial manner and the gas axially enters the chamber. This causes atomization of the liquid and gas which is then expelled through the orifices at the end of the mixing chamber.

WO 97 02863 does not teach the above aspect of Applicants device, as both the carbon dioxide gas and the extinguishing liquid are independently controlled to ensure proper mixing of the two elements within the mixing chamber.

In light of the differences over the art recited above, it cannot be said that a person skilled in the art would be led directly and without the application of inventive ingenuity, to achieve the present invention. There is no direction or suggestion in the prior art, or in the knowledge common to this field, to incorporate the valve assembly including the first and second valves of Applicant's present invention in combination with a fire extinguisher .

With respect to the Examiner's rejections of claims 10, 12, 13 and 21, since these claims depend from amended independent claims 1, 2 and 11, which are now believed to be in proper form and patentable in view of the relevant cited art, these rejections are traversed.

Re: Item VII.

With respect to the Examiner's comments under Item VII, Applicant draws to the Examiner's attention that the independent claims (1, 2 and 11) have been amended in accordance with Rule 6.3(b).

More specifically, claim 1 has been amended to reflect within the preamble the reference cited by the Examiner, and to further define the claimed subject matter of the first and second valves, see lines 1 et seq.

Claim 2 has been amended at line 9 to properly define the actuation means with respect to the first and second valves.

Claim 11 has been amended to revise the preamble, and to further define the claimed subject matter of the actuation means and the first and second valves.

The description has also been adapted to the claims as amended at pages 2 and 3, under Rule 5.1(a)(iii).

The prior art document cited by the Examiner (WO 97 02863 has been

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briefly discussed in the description, see page 1A, lines 1 et seq, under (Rule 5.1(a)(ii).

Regarding the requirements of Article 34(2)(b) and Rule 66.8(a) , Applicant notes that the identification of the amendments with respect to Items V, VII and VIII have been clearly marked as outlined above and below, with respect to each of the Examiner's points in the written opinion.

Re: Item VIII

The Examiner has made certain observations on the present application, with respect to claims 5, 9 and 11.

Applicant respectfully draws to the Examiner's attention that Claim 5 has been amended to clarify the release valve portion comprising the reduced section (claim 5, lines 3 to 4). However, Applicant notes that the antecedent basis for "said intermediate position" as claimed is defined in claim 3.

With respect to claim 9, this claim has been amended to revise its dependency to depend from claim 8 passage (claim 9, line 1). With respect to the term " position intermediate the other end of said bore", Applicant notes that claim 9, is dependent on the various preceding claims including claim 3, in which there is provided the proper antecedent basis for the phrase " position intermediate ..".

Further, the term in question would be readily understood from those skilled in the art upon a review of the disclosure what is meant by the claims and the disclosure with reference to the position intermediate the other end of said bore.

European Patent Office

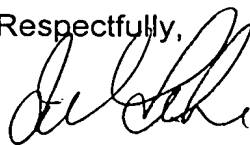
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Further, support for the wording of the claim may be found on page 4, second paragraph and page 5, first three lines, and as shown in Figure 2, 3, 4 et seq.

Applicant notes the Examiner's suggested amendment with respect to Claim 11 ; the more appropriate term "to" has been inserted to replace the term "through" (claim 11, line 12).

In light of the above amendments, a favourable International Preliminary Examination Report is anticipated.

Respectfully,



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Encl. Replacement pages 1A, 2, 2A and 3
Amended claims 1 to 22 (claim pages 9 to 15)

WO 97 02863 to Richter, Joachim discloses a fire extinguisher and a specially designed spray nozzle for producing a jet of extinguishing agent, wherein the extinguisher comprises a pair of containers adapted to store carbon dioxide gas and extinguishing water, whereby upon mixing inside the spray nozzle the carbon dioxide gas causes the water droplets to freeze, allowing for improved throwing ranges.

It is therefore an aspect of the present invention to provide an extinguisher in which water and air are stored together and are released simultaneously and separately to produce a fine liquid mist, capable of class A:B:C rating.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an apparatus for producing a fine liquid mist, comprising a container (10) for holding a gas and liquid under pressure, valve means for releasing the gas and the liquid from the container, a nozzle, feed means operatively connecting the nozzle and the container, and a mixing chamber in the nozzle, the mixing chamber having outlet orifices for emission of the liquid mist, the outlet orifices being at a discharge end of the mixing chamber characterized in that the container having actuation means for simultaneously actuating first and second valve means, the actuation means comprising a single actuation lever for simultaneously opening and closing both of the valve means; the valve means comprising a first valve for controlling and regulating the flow of liquid from a container to a first supply means and a second valve for controlling and regulating the flow of gas from the container to a second supply means, wherein simultaneous release of the liquid and the gas is achieved when the single actuating lever is displaced whereby movement of each of the first and second valves occurs, and wherein the mixing chamber includes two separate inlets at one end, a first inlet for injection of the liquid radially into the mixing chamber and a second inlet for injection of the gas axially into the mixing chamber for atomization of the liquid.

In another aspect of the present invention, there is provided a release assembly for simultaneously releasing a gas and a liquid separately from a pressurized container containing the gas and liquid and to permit feeding the liquid and the gas as individual, separate fluid streams from the container and to and through the valve, characterized in that the release assembly is a single actuating means connected to first and second valves for simultaneously actuating the valves, the first valve for controlling and regulating the flow of liquid from a container to a first supply means, the second valve for controlling and regulating the flow of gas

from the container to a second supply means, and whereby movement of the single actuating means effects opening a closing of the valves to effect control and regulation of flow of the liquid and the gas.

In a further embodiment of the present invention, there is provided a liquid mist fire extinguisher, comprising a container for holding a gas and a liquid under pressure, a valve assembly at an upper end of the container for releasing the gas and the liquid from the container, a hose and a nozzle assembly, characterized in that the extinguisher has a single actuating means for simultaneous release of the liquid and the gas by simultaneously actuating first and second valve means, the actuating means controlling spaced apart first and second valves, and wherein the valve means simultaneously releases the gas and the liquid separately from the container, the first valve means controlling and regulating the flow of liquid from a container and the second valve controlling and regulating the flow of gas from the container.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross-section of a fire extinguisher according to the present invention;

Figure 2 is a cross-section of the valve structure at the top of the extinguisher of Figure 1, to a larger scale, and at right angles to that of Figure 1; with valve closed;

Figure 3 is a cross section similar to that of Figure 2, with valve open;

Figure 4 is a cross section of the valve structure, on the axis of the cross section of Figure 1;

Figure 5 is a longitudinal cross section through the nozzle;

Figure 6 is an end view on the end of the nozzle member, in the direction of arrow A.

Figure 7 is a cross-section of another embodiment of the valve structure of the present invention, on the axis of the cross-section Figure 1.

Figure 8 is a cross section of another embodiment of the valve structure of the present invention, on the axis of the cross section of Figure 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings illustrate a fire extinguisher assembly having an A, B and C rating comprising a pressure container 10 of, for example, an approximately 12L capacity having at its upper end a valve structure 12, and flexible hose 14 with a relatively ridged wand portion 16, and a nozzle assembly 18 at the end of the wand 16. The valve structure 12 closes the upper end of the container which, in use contains a liquid, for example, water, at its lower portion 20 and a pressurizing gas, for

I CLAIM

1. An apparatus for producing a fine liquid mist, comprising a container (10) for holding a gas and liquid under pressure, valve means (12) for releasing said gas and said liquid from said container (10); a nozzle (18), feed means (14) operatively connecting said nozzle and said container, and a mixing chamber (126) in the nozzle, said mixing chamber (126) having outlet orifices (132) for emission of said liquid mist, said outlet orifices (132) being at a discharge end of said mixing chamber (126),

c h a r a c t e r i z e d in that

said container having actuation means for simultaneously actuating first and second valve means, said actuation means comprising a single actuation lever for simultaneously opening and closing both of said valve means;

said valve means comprising a first valve (62) for controlling and regulating the flow of liquid from a container (10) to a first supply means (112) and a second valve (64) for controlling and regulating the flow of gas from said container (10) to a second supply means (110) ; wherein simultaneous release of said liquid and said gas is achieved when said single actuating lever (82) is displaced whereby movement of each of said first and second valves occurs, and wherein

said mixing chamber (126) includes two separate inlets at one end, a first inlet (125) for injection of said liquid radially into the mixing chamber and a second inlet (128) for injection of said gas axially into said mixing

chamber (126) for atomization of said liquid.

2. A release assembly for simultaneously releasing a gas and a liquid separately from a pressurized container containing said gas and liquid and to permit feeding said liquid and said gas as individual, separate fluid streams from said container and to and through said valve, characterized in that :

the release assembly is a single actuating means (82) connected to first and second valves for simultaneously actuating said valves,

said first valve (62) for controlling and regulating the flow of liquid from a container (10) to a first supply means (112);

said second valve (64) for controlling and regulating the flow of gas from said container (10) to a second supply means (110) ; and
whereby movement of said single actuating means effects opening a closing of said valves to effect control and regulation of flow of said liquid and said gas.

3. A release valve according to claim 2, comprising an elongate valve member (60), and spaced apart valve seats (38, 42), said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position intermediate the other end of said valve member (60) and said first valve (62), said means (82) for actuating said valves positioned at the other end of said valve member (60).

4. A release valve according to claim 3, further comprising an enlargement at said one end, movable axially to open and close an orifice.
5. A release valve according to claim 4, further comprising a reduced section at said intermediate position of said valve member 60, axially spaced inlets and outlets, said reduced section movable axially to a position connecting said inlet and outlet.
6. A release valve according to claim 5, comprising a valve body (30), said elongate member (60) positioned in a bore in said valve body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in said bore.
7. A release valve according to claim 6, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the other end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means for feeding said gas from said chamber (46) to said outlet.
8. A release valve according to claim 7, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).

9. A release valve according to claim 6, comprising means (70) for feeding gas through said body (30) to a port (76) in said bore and a transfer passage (46) in said body (30) at a position intermediate the other end of said bore, said reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said gas from said transfer passage (46) to said outlet.
10. A release valve according to claim 9, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
11. A liquid mist fire extinguisher, comprising a container (10) for holding a gas and a liquid under pressure, a valve assembly (12) at an upper end of said container (10) for releasing said gas and said liquid from said container (10), a hose and a nozzle assembly (18), characterized in that
the extinguisher has a single actuating means (82) for simultaneous release of said liquid and said gas by simultaneously actuating first and second valve means (62, 64), said actuating means controlling spaced apart first and second valves (62, 64); and
wherein said valve means (62,64) simultaneously releases said gas and said liquid separately from said container (10), said first valve means (62) controlling and regulating the flow of liquid from a container (10) and

said second valve (64) controlling and regulating the flow of gas from said container (10).

12. A fire extinguisher as claimed in claim 11, including a gas conveying tube (110) within said hose (14) for feeding said gas.
13. A fire extinguisher as claimed in claim 12, said valve means (60) comprising a first valve (62) controlling a liquid outlet from said container (10), a second valve (64) controlling a gas outlet from said container (10), means (14) for feeding said liquid and said gas separately from said valves, and means (82) for actuating said valves simultaneously.
14. A fire extinguisher as claimed in claim 13, said first valve (62) formed at one end of said valve member (60), said second valve (64) formed at a position intermediate at the other end of said valve member (60) and said first valve (62), said means (82) for actuating the said valves simultaneously positioned at the other end of said valve member (60).
15. A fire extinguisher as claimed in claim 14, further comprising an enlargement at said one end, movable axially to open and close an orifice.
16. A fire extinguisher as claimed in claim 15, further comprising a reduced section at said intermediate position, axially spaced inlets and outlets, said

reduced section movable axially to a position connecting said inlet and outlet.

17. A fire extinguisher as claimed in claim 16, comprising a valve body (30), an elongated member (60) positioned in a bore in said body (30), said orifice formed at one end of said bore, and means (26) for feeding said liquid from said orifice to an outlet in a said bore.
18. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a chamber (46) in said body (30) at the outer end of said bore, said reduced section movable to connect and disconnect said port (76) to said chamber (46) and means (70) for feeding said gas from said chamber (46) to said outlet.
19. A fire extinguisher as claimed in claim 18, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
20. A fire extinguisher as claimed in claim 17, comprising means (70) of feeding gas through said body (30) to a port (76) in said bore and a transfer passage (46) in said body (30) at a position intermediate the outer end of said bore, said reduced section movable to connect and disconnect said port (76) to said transfer passage (46) and means (114) for feeding said

gas from said transfer passage (46) to said outlet.

21. A fire extinguisher as claimed in claim 20, including connection means (112) for connecting a feed means (14) to said outlet and feeding said liquid and said gas separately to said feed means (14).
22. A fire extinguisher according to claim 11, wherein said nozzle assembly (18) includes an angled face (130) at one end.